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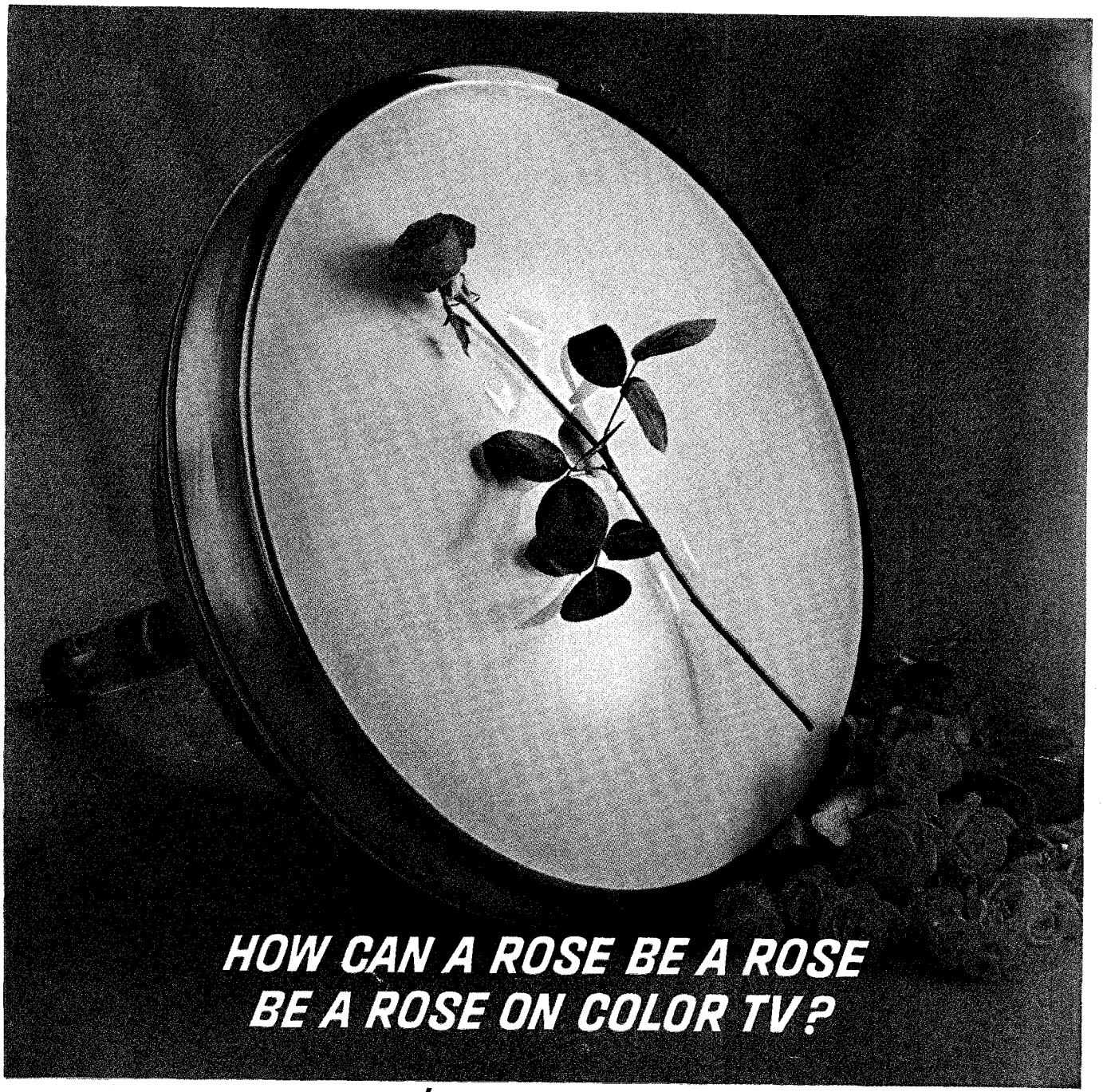

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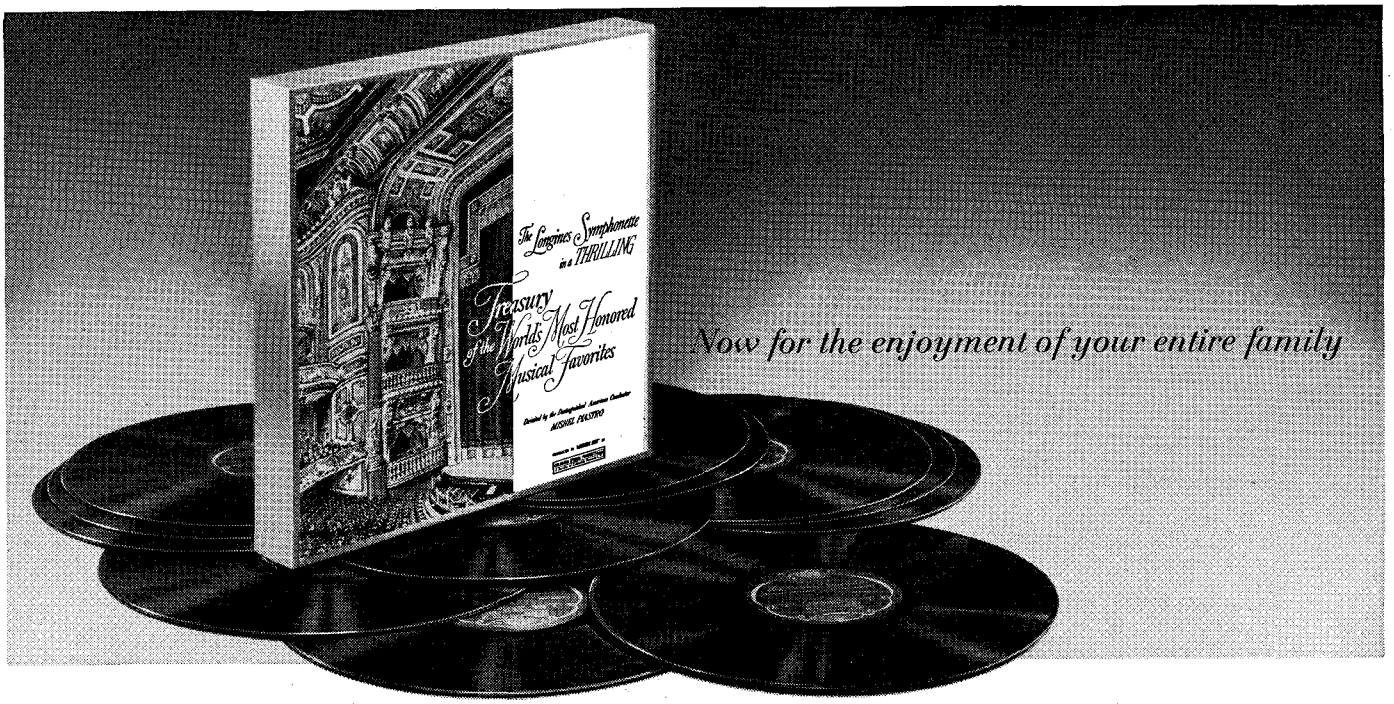
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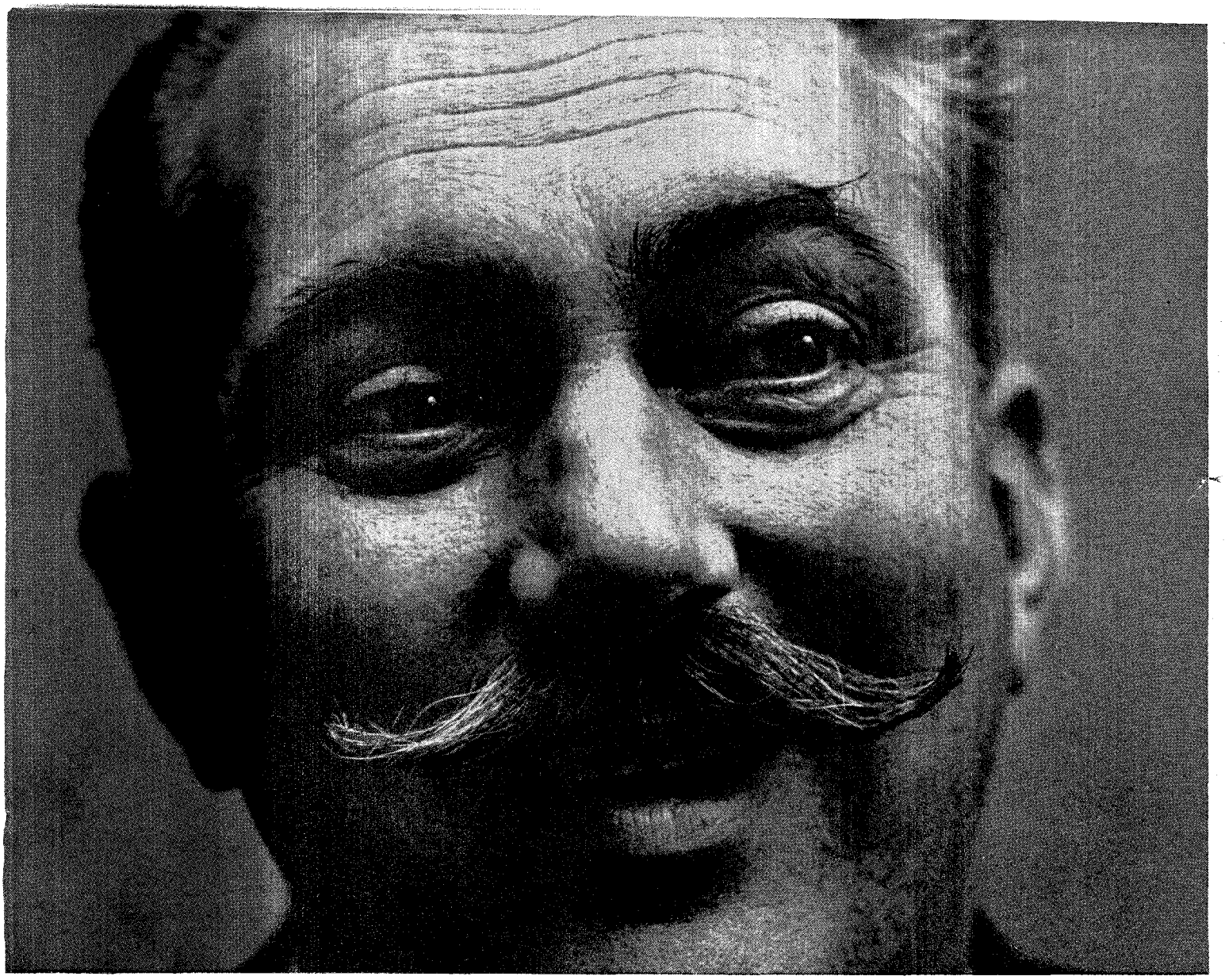

Robert Dove began his career as a waiter at London's famous Savoy. He first served Royalty at the age of 17. Since then he's waited on Counts, Earls, Dukes, Duchesses and even a Sheik complete with harem. Now at 43, he's a Senior Steward in First Class for BOAC. If you want to find out what the words "first class" really mean, let Robert show you. He's English. And after all, they invented the phrase.

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EDITORIAL
AND ADVERTISING OFFICE:
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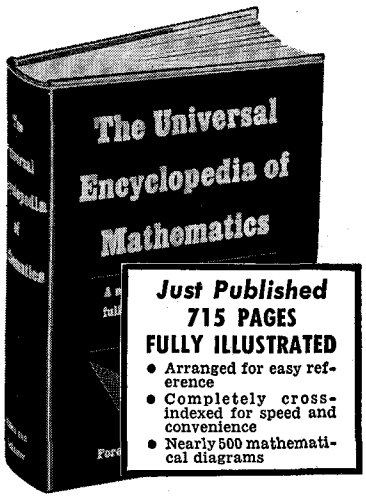
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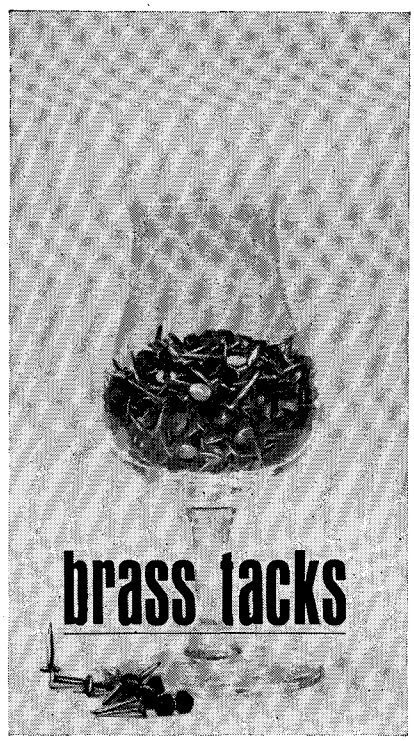

Dear Mr. Campbell:

In the April Analog you published my letter lampooning the people who deny the "twin Effect," after which you asked, "If all frames of reference are equally valid—an underlying assumption of Relativity—then why can't the traveling twin say that the Earth was doing the fast moving, and had the slow time?"

Now in the August Analog you have published "Relativity Episode No. 1," which frankly asks for an answer. So I shall try to kill two birds, relatively speaking, with one missive.

The first thing to notice in "Relativity Episode No. 1" is that the speed required to give the specified ten-to-one contraction is .995 light-years per year. If this speed is to be picked up "during the night"—that is, in 1/730 of a year—an acceleration of about 726 light-years per year per year will be required even if the acceleration is *constant as seen by a stationary observer*. However, this plan would give an acceleration which is far from constant *as seen by the steel shaft*. Indeed, the shaft would see its acceleration gradually increase to a thousand times its starting value. Therefore, it is more reasonable to use an acceleration which is constant as seen by the shaft. This will have a starting value about fourteen times as great as the other, or around 10,000 light years per year per year. Fortunately for our calculations, an acceleration of one light-year per year is within a few per cent of being equal to the normal acceleration of gravity on the surface of the earth, commonly called a "g". So the shaft must be given an acceleration of 10,000 g's, which is about the acceleration a bullet experiences in being shot from a gun. The rocket motors will have to be placed every few feet along the shaft, or it will simply snap apart under its own inertia. I don't know where you'll find rockets that will maintain that sort of acceleration. The true answer to the problem is that if you *could* do it, no one would see anything the next morning, because stars, observers, shaft and all would be wrapped up in a huge cloud of exhaust gases.

Setting aside such niggling—i.e., practical—considerations, assume it can be done and is done. At such a great acceleration, it will be only a few minutes before relativity effects become significant. Simultaneity will become "tilted" so that it will appear to each part of the shaft that the parts up ahead are pulling away because they started a little sooner than it did, and that the parts farther back are falling behind because they started a trifle late. By the end of about seven minutes this effect will have become serious enough to stretch the shaft by one per cent of its length. Depending on the ultimate strength of the steel used, the shaft will begin to break apart somewhere around ten minutes to a quarter of an hour after getting under way.

How long will the pieces be? If the shaft were *perfectly* uniform, it would presumably break just behind each rocket motor simultaneously. (Except near the ends, which will be dealt with in a moment.) As no shaft is perfectly uniform, it will break some place first and this will then relieve the tension on each side of the break. But the tension relief can travel away from the

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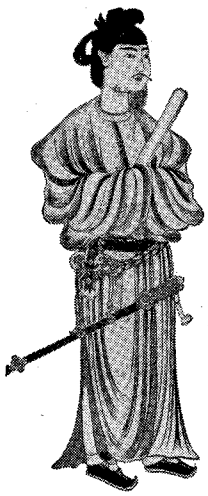

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SOME PERTINENT DETAILS

PICTORIAL. Bradley Smith, who is known throughout the world for his incomparable photographs of art works, was given access to priceless and fragile masterpieces in museums, Buddhist temples, Shinto shrines and private collections (including that of the Imperial Household) in Kyoto, Nara, Atami, Yokohama, Kamakura, Tokyo and elsewhere in Japan. His color photographs, made especially for this book, are unretouched.

HISTORICAL. During the writing and photographing, Mr. Smith was in consultation with leading scholars in Asia and the West. Two of the most distinguished have contributed to the book. The *Art Introduction* is by NAGATAKE ASANO, Director of the Tokyo National Museum. The *Historical Introduction* is by MARIUS B. JANSEN, Professor of Japanese History and Director of the East Asian Studies Program at Princeton University.

PRODUCTION. The 6-color lithography is by Japan's finest printers, Toppan of Tokyo. Color endpapers and dividers are of Japanese handmade papers. The book is 8¾" x 12½", bound in woven cloth on which the title in Japanese is stamped in gold after a model by a master calligrapher.

Pictured at the top of this page: Prince Shōtoku (born in 572) under whose benevolent guidance Buddhist culture flourished in Japan for the first time. Detail from a 7th century posthumous portrait, color on paper, from the Imperial Household Collection, Kyoto. The complete painting is reproduced in full color on page 39.

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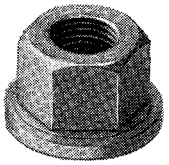
this is one  of them

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RACE RIOTS AN EDITORIAL BY JOHN W. CAMPBELL

When the Lion shall lie down with the Lamb—the Lion is going to be in serious trouble. The Lamb, of course, can baaaaah happily as it goes gamboling off through its breakfast, lunch and dinner supply—but the Lion's in a different spot. He can't live on grass. His digestive system is intrinsically incapable of extracting nourishment from herbal food supplies. It's no good trying to persuade him to learn a new way of life, and be happy eating grass, fruits and twigs; he can't.

During the hot summer nights last year, race riots broke out in various cities in the Northeast. New York—Rochester—Jersey City—Chicago—Paterson—and other towns had their riots or near-riots as emotions boiled over.

These were undoubtedly true race riots—but I want to suggest that *they were not Negro-vs.-White riots.* They only had that surface appearance.

For one thing, remember that only about 0.05% of the Negroes of Harlem, for instance, participated in the rioting. Moreover, while the New York City riots were essentially 100% Negro, this was *not* the pattern in Rochester, Chicago, and other places. There white juveniles did their rioting, looting and destroying, too. Once the riots got started, it was a happy orgy of looting, destruction, and outlawry in which all interested were joining the party.

They were race riots, all right—but the races involved were Barbarians vs. Citizens—and neither skin-color, religion, or home-background had anything whatever to do with it.

Dr. Kenneth Clark, Harlem's Negro psychologist, of course maintains that it's the poor home environment of the Harlem Negro youths that leads to such behavior—the frustrations and tensions of rejection, poor education, and slovenly home environment.

That's open to argument, of course, since it's proper to ask "Who makes the slovenly home environments?" But skip that problem for a moment, and recognize that full-fledged Juvenile Delinquents come from fine homes, with excellent economic, educational, and social backgrounds.

The Barbarian type is a *genetic* type—he's born that way. True, he can be influenced to some degree—but he's *inherently* a Barbarian, and he'll be a Barbarian no matter what his economic, educational, or social background may be.

First off, let's stop pretending that "all men are born equal"; they aren't, never were, and never will be. They're born with vastly different potentials, and vastly different inherent motivations. It's currently fashionable to say that it's lack of educational opportunities, economic opportunities, et cetera, that keeps the poor man poor and hopeless. This is utter nonsense, as history proves in any number of instances you want. Abraham Lincoln, maybe, had excellent educational, economic and social background? Or what's your particular choice of field of accomplishment? Science? Then how about Michael Faraday? Or try another type of handicap; how about Charles P. Steinmetz? And, on the other side, every millionaire's son becomes a genius in his own right because of his educational, economic and social advantages?

The men of great personal accomplishment aren't necessarily beneficial to the race, of course. But to see that the much-discussed educational, economic and social advantages don't seem to matter much—consider Adolph Hitler and Genghis Khan.

Those advantages are helpful—to individuals with the right kind of potential. But *the individual must have the potential as a genetic gift.*

It's currently popular to hold that Nurture is Everything, and Nature is an unimportant accident of no real importance. The argument is usually advanced on behalf of the poor, downtrodden, dispossessed, rejected slob who never did anything useful for himself or anyone else.

O.K.—try applying it to the millionaire's sons. By the nature of the argument, it follows that every millionaire's son should prove to be a genius. Since they quite obviously don't, despite having every possible advantage (except inherent nature!) it's essential for the social-liberal who claims it's lack of such advantages that makes the poor man poor, to explain why the rich man's son so frequently turns out to be simply a rich slob. The social-liberal is always quick to hold that the rich man's son *is* selfish, egotistical, useless parasite; is that the effect of every educational and economic advantage? Is that what he wants for the poor man's son?

Of course, there are rich men's sons who have turned out to be fully as brilliantly constructive and creative as their sires—but that's not surprising. There are also poor men's sons who've turned out brilliantly constructive, too. More poor men's sons turn up as great benefactors than rich men's sons, for that matter—which is not too surprising, in view of the fact that there are about 100,000,000 poor men having sons for every rich man having a son.

In any case, the social-liberal who is constantly insisting that it's educational, economic and social advantages, *and only that,* that makes the

continued on page 94

THIS EDITORIAL WAS WRITTEN TWO WEEKS BEFORE THE F.B.I. REPORT ON THE "RACE RIOTS" WAS PUBLISHED.

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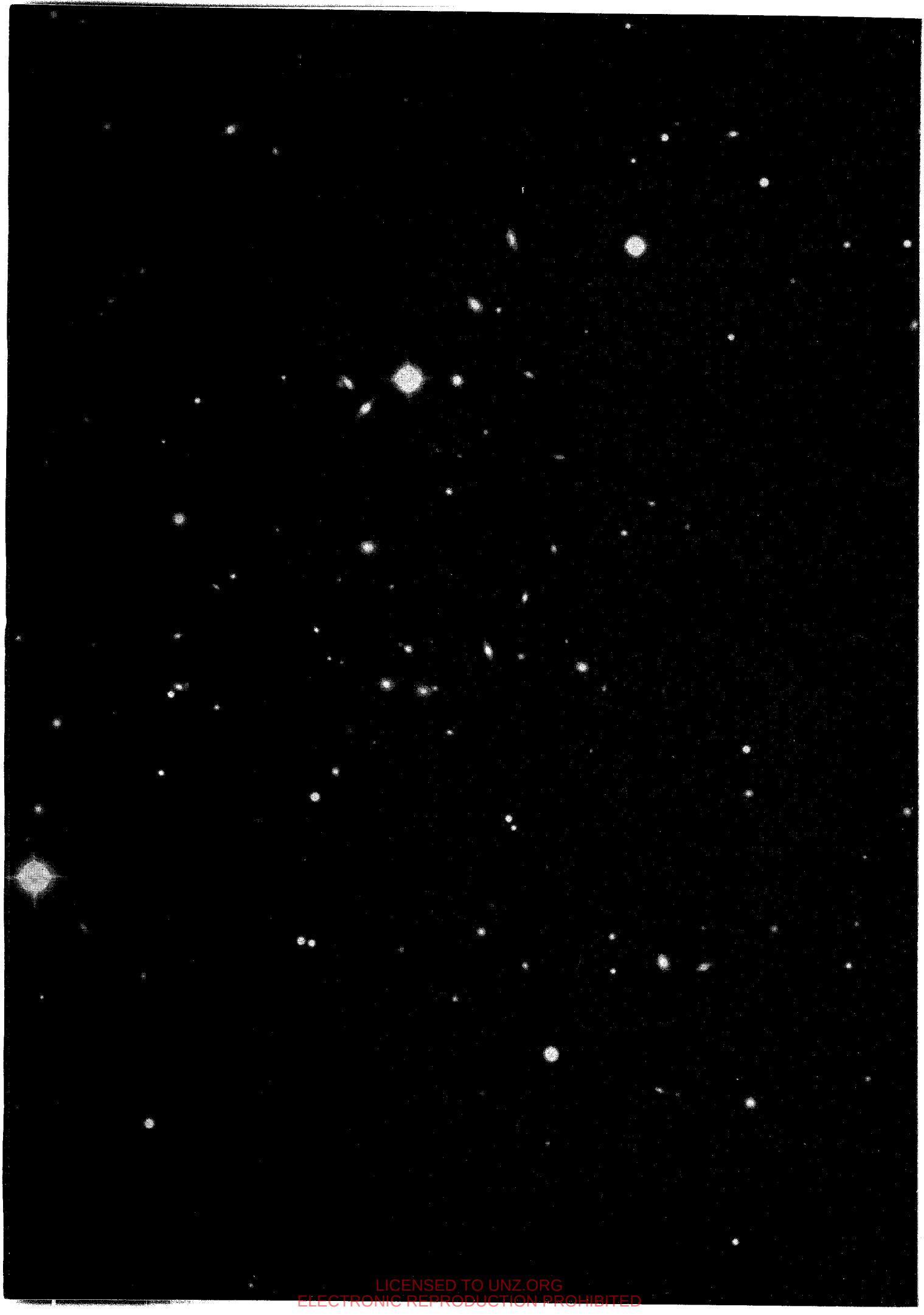

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IT'S DONE WITH MIRRORS

A beautiful suggestion of speculative thinking as to the nature of this Universe we live in, and the deeply mysterious quasi-stellar objects.

WILLIAM F. DAWSON | BEN BOVA

Dawson & Bova have come up with another highly interesting cosmological speculation. (Which is a fine game for amateurs; the pros don't know much about it either!) This time, it's the quasars—the quasi-stellar objects that have been driving serious astrophysicists to suggest energy-release mechanisms more fantastic even than anything the science-fiction authors have pulled off! No known energy-release mechanism can account for the appalling output of a quasar; nothing ever observed, and no process deducible from known mechanisms is adequate.

Therein lies the Dawson-Bova contribution. There's one long-ago suggested mechanism of appalling energy release that certainly would be adequate to explain the observations . . .

THE EDITOR

Scientists deal with facts—or at least they try to. At the very frontiers of knowledge—the substructure of nucleons, the workings of the genetic code, the edge of the observed universe—it is often difficult to determine what the facts are.

Cosmology is particularly frustrating in this respect. You can bombard nuclear particles in an accelerator. You can unravel DNA molecules in a laboratory. But it is impossible to tinker with the universe at large, to "run an experiment" and see if it checks with theory.

On the other hand, there is plenty of room in cosmology for speculation. For example, you can speculate on this:

How small is the universe?

Not the *known* universe, the part we can see with optical and radio telescopes; that only extends out to 10 billion light-years or less. Not the *observable* universe; that includes only those galaxies that are moving away from us at less than the speed of light. How small is the entire universe, all of it, regardless of whether we can see it or not?

Is it a dab of matter in an infinity of space? Is it an endless sea of matter and energy, galaxies upon galaxies, without boundary in space or time?

Or is it something much less grandiose?

Before carrying this speculative line of inquiry any further, we should take a careful look at the agreed-upon facts: the astronomical observations. We must view the observations as nothing more than a starting point, though. For cosmology is concerned with interpreting the observations, and fitting them into a theoretical framework that can explain why the universe looks the way it does.

To begin with, our solar system is part of a large spiral galaxy, the Milky Way, which contains some 100 billion stars and nearly the same amount of mass in uncondensed interstellar gas and dust. Our sun is apparently an average star, situated some 30,000 light-years from the Milky Way's center. The galaxy is presumed to have a diameter of about 100,000 light-years along its major axis, and is probably some 30,000 light-years across at its thickest point, near the center.

Until 1923, most cosmologists believed that the Milky Way galaxy encompassed the entire universe. The American astronomer and cosmologist, Harlow Shapley, was among this majority. However, Shapley was a pioneer in developing a technique for using pulsating stars as distance measurers. When he tried the technique on the Andromeda "nebula," and found that it was much farther away than the limits of the Milky Way, Shapley abandoned his earlier notions about the size and structure of the universe.

Left: A group of very faint galaxies, in the constellation Coma Berenices. Estimated distance, based on red-shift measurements, is about one billion light-years.
(Mount Wilson and Palomar)

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IT'S DONE WITH MIRRORS

Cosmology took on a new outlook. Very quickly it became evident that the Milky Way was merely one galaxy out of myriads. More than a billion galaxies have been recorded on photographic film to date. The galaxies fall into three general categories, based on structure: irregular, spiral, and elliptical. The Milky Way is a very large spiral galaxy.

Our galaxy is attended by two smaller companions, the Clouds of Magellan. These irregular-type dwarf galaxies are about 150,000 light-years from the sun. There is some evidence that the Clouds may be linked, and their appearance as two separate bodies is an artifact caused by our particular angle of view in regard to them.

Reaching further out, we see that the Milky Way is a member of a small association of galaxies, called the Local Group—surely the most prosaic name in all of astronomy. The Local Group contains spiral, elliptical and irregular galaxies. Most of the twenty-odd members of the Group are comparatively small galaxies, although the great spiral in Andromeda is one of the largest galaxies known, and is comparable to our own Milky Way in size. The Andromeda spiral is some two million light-years from us, according to current calculations, and one of the farthest members of the Local Group.

The Local Group is a small and rather loose cluster of galaxies. Deeper out in space, much larger clusters can be seen. Gigantic clusters, containing thousands of galaxies, seem to extend as far as telescopes can reach. In many of these clusters, some galaxies are apparently colliding with each other; astronomers take this as a natural consequence of the great density of galaxies within such clusters.

The so-called colliding galaxies are extremely powerful sources of radio noise. Many other galaxies, although single, are also strong radio emitters. Most galaxies, like our own Milky Way, are comparatively quiet in the radio wave lengths, and produce most of their energy as light.

Note that as we look deeper into space, we are probing further back in time. We see the Andromeda spiral as it existed two million years ago. The light we receive from some of the more distant clusters of galaxies actually left those bodies billions of years ago. It is now assumed that the universe is at least 10 billion years old. If we can observe galaxies at distances of 10 billion light-years, then, can we watch the beginning of the universe?

Distance measurements on the scale of billions of light-years are very imprecise. But astronomers have been able to detect objects at distances on the order of 5 to 10 billion light-years. These objects are the so-called quasi-stellar radio sources.

These quasi-stars—or *quasars*—have been recognized only within the past couple of years as one of the most startling phenomena ever observed. Cosmology is studded with big numbers, but the quasars have set even the normally-imperturbable cosmologists literally agog.

THE LOCAL GROUP

GALAXY	TYPE	DISTANCE (1000LY)	DIAMETER (1000LY)	RADIAL VELOCITY* km/sec	MASS (solar masses)
MILKY WAY	Spiral	—	100	—	2×10^{11}
LARGE MAGELLANIC CLOUD	Irregular	160	30	+276	2.5×10^{10}
SMALL MAGELLANIC CLOUD	Irregular	180	25	+168	—
URSA MINOR SYSTEM	Elliptical	220	3	—	—
SCULPTOR SYSTEM	Elliptical	270	7	—	2 to 4 $\times 10^6$(?)
DRACO SYSTEM	Elliptical	330	4.5	—	—
FORNAX SYSTEM	Elliptical	600	22	+39	1.2 to 2 $\times 10^7$(?)
LEO II SYSTEM	Elliptical	750	5.2	—	1.1×10^6(?)
LEO I SYSTEM	Elliptical	900	5	—	—
NGC 6822	Irregular	1500	9	−32	—
NGC 147	Elliptical	1900	10	—	—
NGC 185	Elliptical	1900	8	−305	—
NGC 205	Elliptical	2200	16	−239	—
NGC 221 (M32)	Elliptical	2200	8	−214	—
IC 1613	Irregular	2200	16	−238	—
ANDROMEDA GALAXY (NGC 224; M31)	Spiral	2200	130	−266	4×10^{11}
NGC 598 (M33)	Spiral	2300	60	−189	8×10^9

*+ *indicates velocity of approach* — *indicates velocity of recession*

The quasars were first discovered by radio telescopes since they are powerful radio sources. Their output at radio frequency has been measured at some 10^{44} ergs per second—a million times greater than the radio output of the whole Milky Way galaxy! But when optical telescopes were trained on these radio beacons, all that could be seen were small faint stars. It was obvious that no matter what they looked like, these radio sources were not ordinary stars. Hence the title of "quasi-stellar sources," abbreviated to quasars.

When the optical astronomers attempted to make spectrographic analyses of the quasars' chemical contents, they were stymied. The spectra resembled nothing known. Rather quickly, it was deduced that the spectra might be red-shifted, and the quasars may actually be very distant objects, far beyond the Milky Way's border.

The red shift is assumed to be a Doppler effect. A luminous object

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moving away from the observer will emit electromagnetic waves that are shifted toward the longer wave lengths in proportion to the object's speed of recession. For visible light, the wave lengths shift toward the red. The same effect holds true for radio frequencies —and indeed, for sound waves, as Doppler originally discovered. An object moving toward the observer, on the other hand, will show a shift toward the shorter wave lengths, or the blue end of the spectrum.

The American astronomer, Edwin P. Hubble, in the 1920s, deduced that the distant galaxies are moving away from the Milky Way in a smooth and predictable manner. The farther the galaxy, the faster its rate of recession. Therefore, by measuring the red shift shown by a galaxy, we can measure its speed of recession and use this as an indication of its distance. The distances to most galaxies are determined this way.

Notice that this distance measurement is very indirect; not only is the distance deduced from the recession velocity, but it is assumed that the red shift is due to an actual motion of the galaxy away from the Milky Way. No one has been able to disprove this assumption, and it certainly is the simplest explanation for the red shift. But the assumption has not been positively proven, either. Incidentally, the spectra of these very remote galaxies are photographed on extremely sensitive plates that measure only fifteen centimeters—about half an inch—on a side. The red shift must be measured under a microscope. There's a paradox: measuring the distances to the edge of the known universe with a microscope!

Red-shift measurements of the quasars showed that they were indeed very remote objects. Their spectra turned out to be quite ordinary, but shifted by as much as fifty per cent toward the red end of the spectrum. This huge red shift makes the quasars the most distant objects ever photographed—between five and ten billion light-years from the sun.

The quasars, then, are not single stars at all, but some peculiar type of galaxy. Most galaxies put out about 10^{44} ergs/sec of visible light and 10^{38} ergs/sec of radio power. The quasars are beaming out 10^{44} on radio wave lengths and 10^{46} ergs/sec of light. Their total power output is thus some one hundred times the total for a normal galaxy. Moreover, at distances of up to 10 billion light-years from us—and distance corresponds to time—the quasars must be very close to the beginnings of the universe.

And that, to date, is what can be seen of the universe: from the Milky Way to the quasi-stellar sources, a radius of perhaps 10 billion light-years. How much of the universe is there that we cannot see?

Cosmologists are generally agreed that the universe is expanding. This is the conclusion they draw from the red shifts shown universally by the more distant galaxies. It is important to note, though, that the galaxies in the Local Group are not partaking of this red shift expansion; some of them are even moving toward the Milky Way.

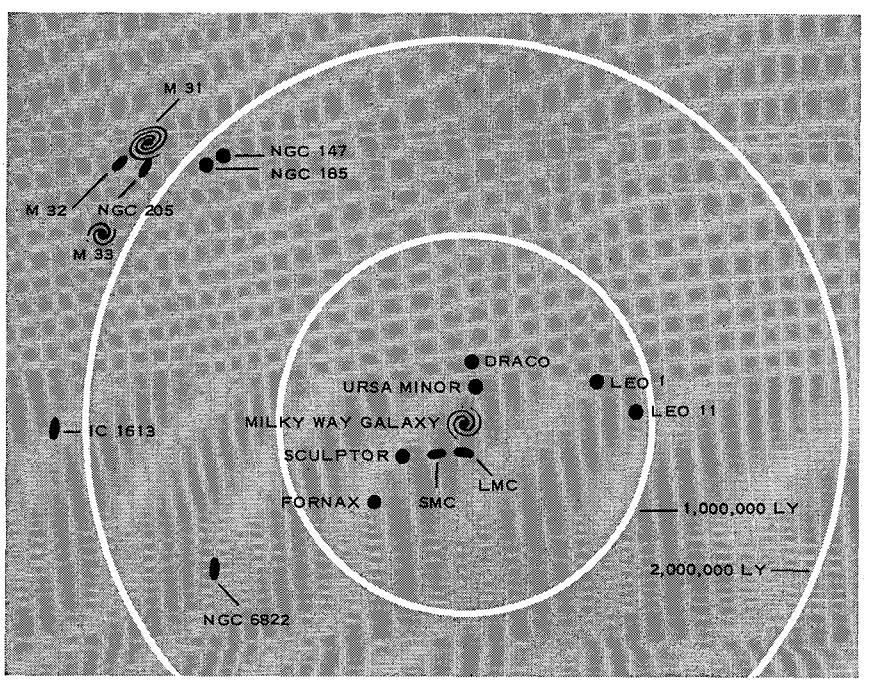
If the universe is expanding, then every group of galaxies is moving away from every other group. The Milky Way, or the Local Group, is not in the center of a fleeing universe. If the quasars are rushing away from us at velocities of forty per cent of the speed of light, then observers on the quasars would see *us* as rushing away from *them* at the same velocity. The expansion is universal and mutual.

The picture that is usually drawn to help visualize this phenomenon of universal expansion is that of a balloon speckled with dots. The dots represent the galaxies, and the skin of the balloon represents space itself. As the balloon expands, the dots move farther apart from one another. An observer on any individual dot would see all the other dots flying away from him. But his own dot would also be flying away from its neighbors.

It should be theoretically possible to see galaxies at distances greater than the 10 billion light-years we can now apparently cover. The galaxies are moving away from us at constantly higher velocities. It is easy to see that at a far enough distance, galaxies will be receding from us at the speed of light. (No, this does not violate any physical law; the recession is mutual, remember. Both the Milky Way and the remote galaxies are mutually receding from each other. The speed of recession we measure is the combined speed—theirs and ours.)

A galaxy that is moving away at a velocity equal or greater than the

Map of the Local Group of Galaxies (after Abell).



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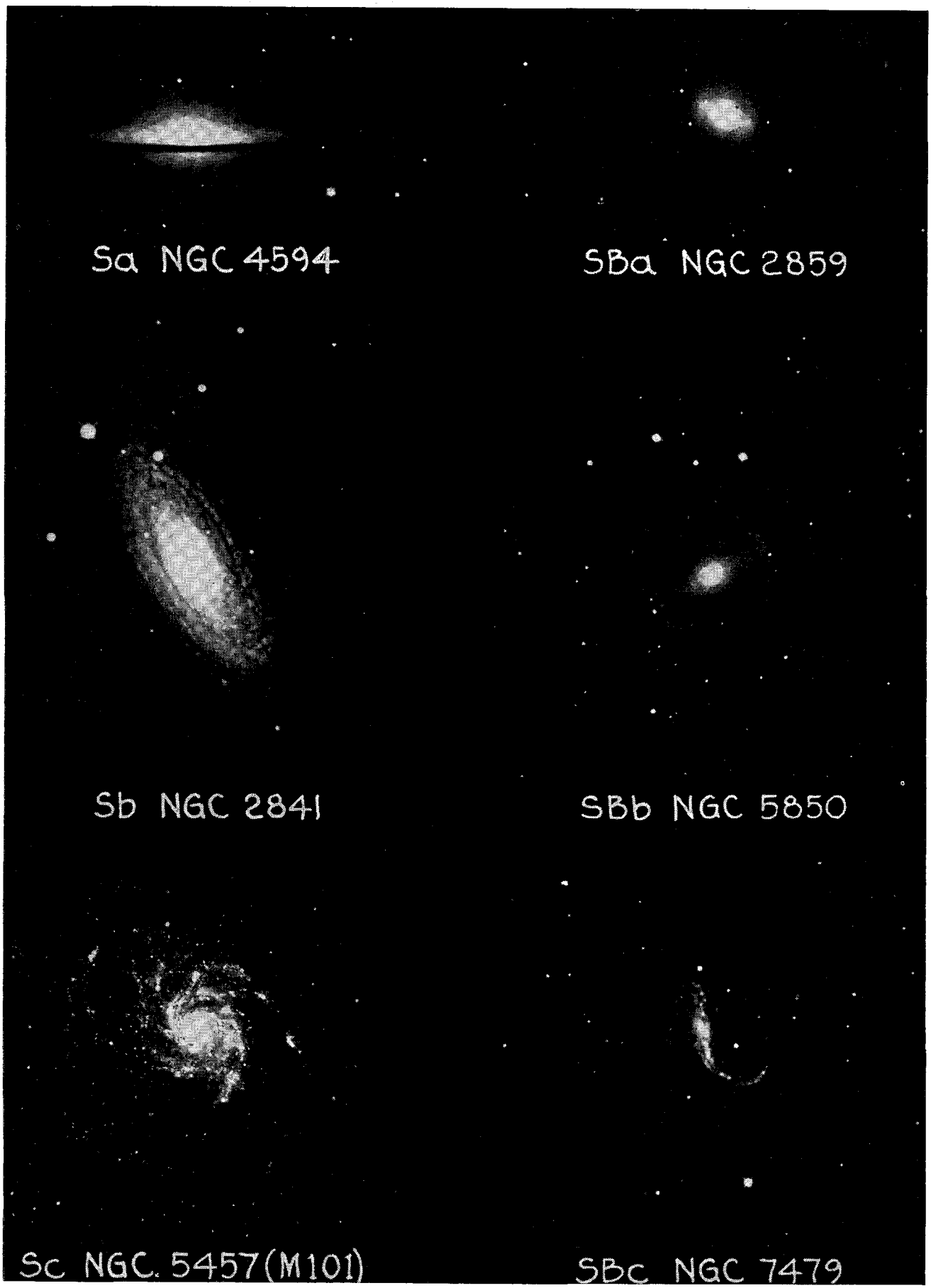

(MOUNT WILSON AND PALOMAR)

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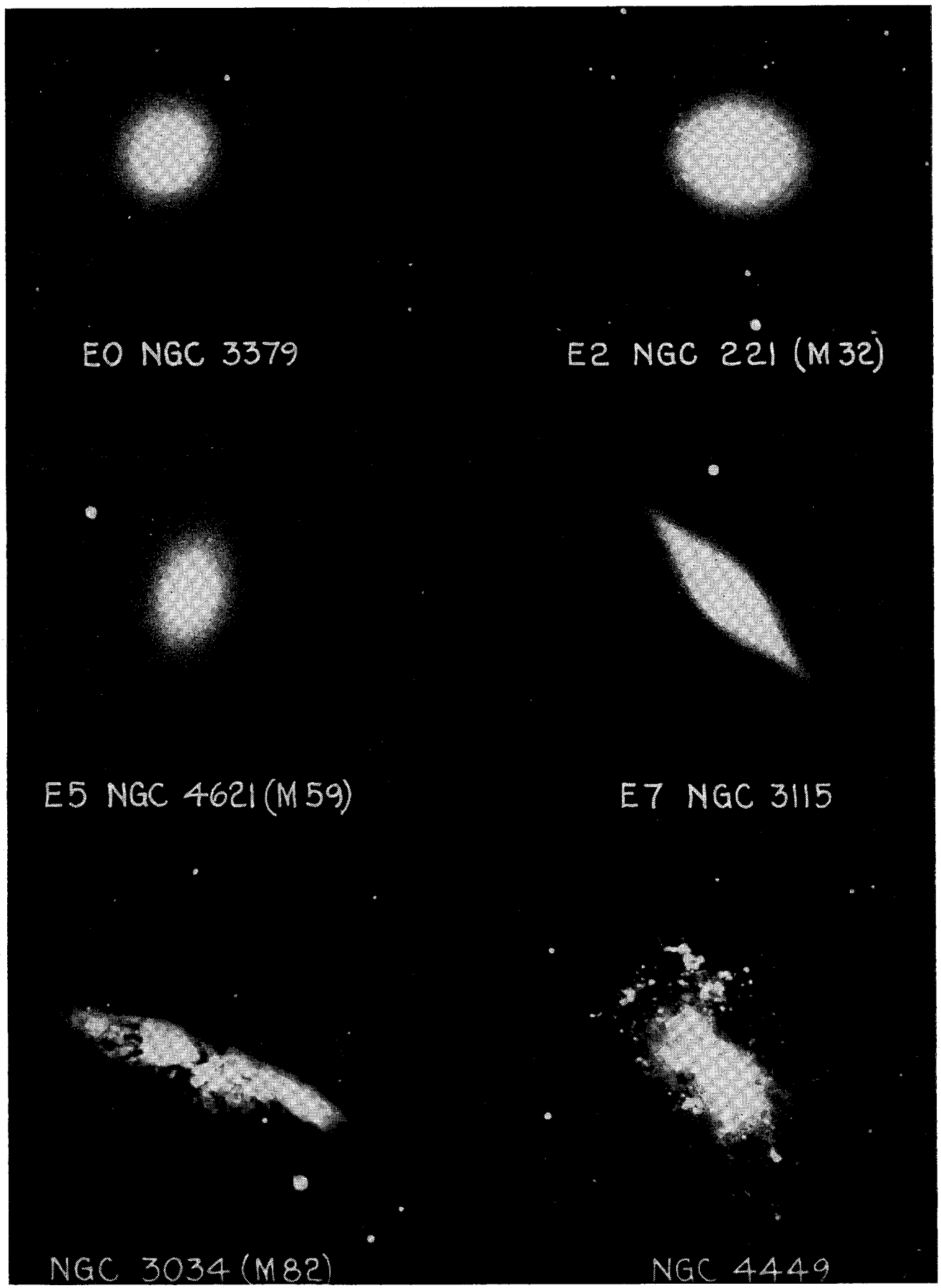

VARIOUS TYPES OF GALAXIES: SPIRALS (S), BARRED SPIRALS (SB), ELLIPTICAL (E), AND IRREGULAR. LETTERS OR NUMBERS AFTER S, SB, AND E SYMBOLS INDICATE DEGREE OF FLATTENING OF THE GALAXY. NGC STANDS FOR NEW GALACTIC CATALOGUE; M STANDS FOR MESSIER CATALOGUE.

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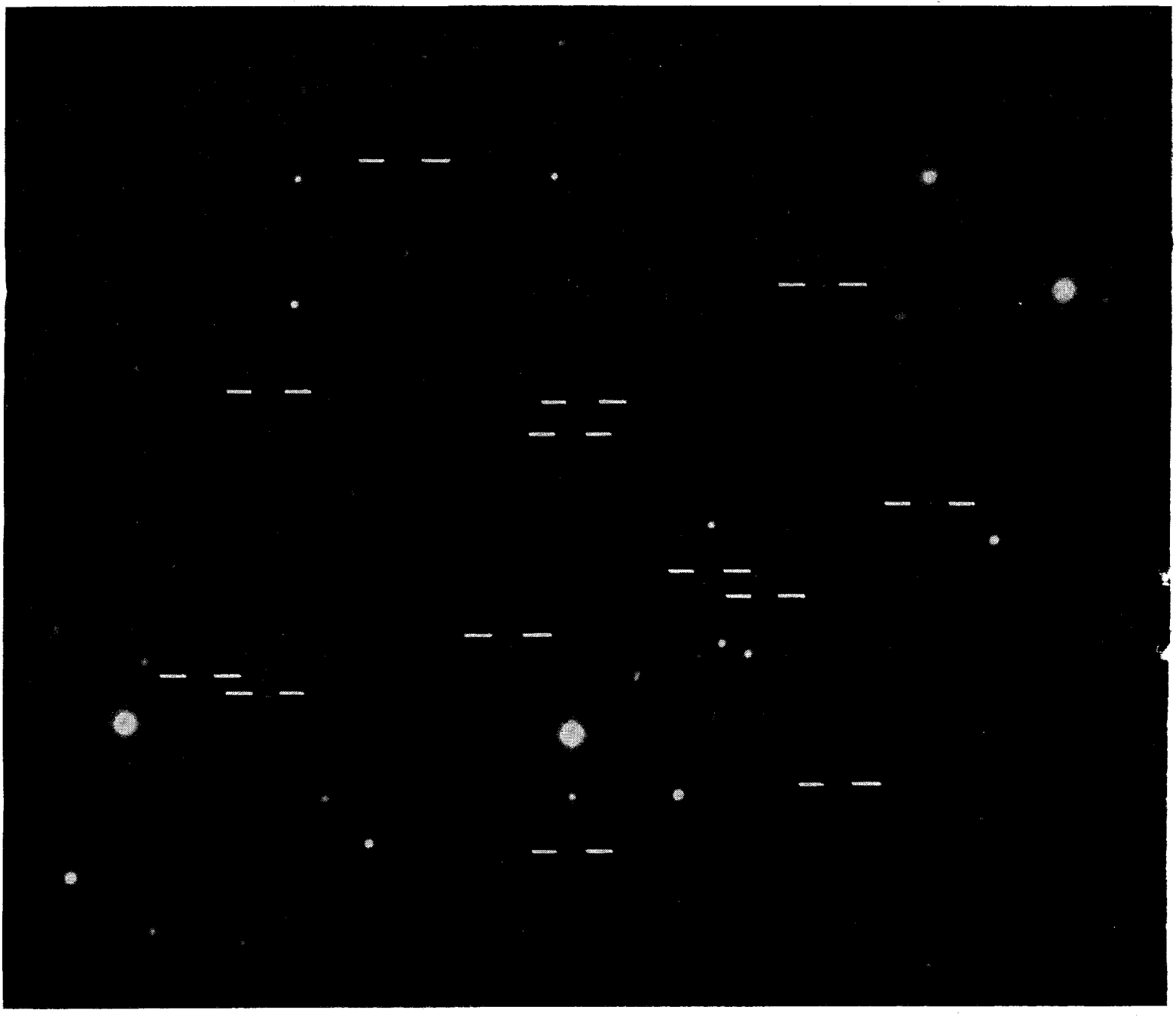
A cluster of galaxies, seen through the constellation Corona Borealis. Spirals can be easily distinguished from ellipticals, even at the estimated distance of 120 million light-years. (Mount Wilson and Palomar)



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speed of light would simply never be seen by us. The speed of light, then, represents a blank wall bounding the borders of the observable universe. This "light curtain" may be about 15 billion light-years from the sun. It represents the edge of the observable universe.

If the idea of an expanding universe zooming off in all directions at once is unnerving, the concept of a static universe is equally so. Because the galaxies simply cannot stay fixed at one point in space. Gravitational attraction would tend to bring them together. A collapsing universe is somehow even more unsettling than an expanding one! There are other possibilities, naturally; but we are digressing too far.

The concept of an expanding universe does not really explain anything. Why should the universe expand? Two major theories have been proposed: the "Big Bang" and the "Steady State."

Very briefly, the Big Bang pictures the universe as starting in a highly condensed state, and then exploding. The expansion of the universe is simply a result of the original explosion. The galaxies are bits of celestial shrapnel flying through space. The Steady State theory claims that the universe had no beginning and will have no end. Galaxies are constantly being created from intergalactic gas. This gas is being continuously renewed by the spontaneous creation of hydrogen atoms—they just appear out of nowhere in intergalactic space. The universe is forced to expand to make room for this new material as it comes into existence.

The theories present a choice: either the universe was created in one great lump of matter and energy, or it is being continuously created, one atom at a time. Not much of a choice, is it?

So far we have talked about the observable universe. Are there galaxies on the other side of the "light curtain?" And what of the nature of space itself? Is it open and infinite—does the universe simply go on and on without limit? Or is space closed and bounded in some way, so that there is a finite number of galaxies that may be contained within it? If space is bounded, what is on the other side of the boundary?

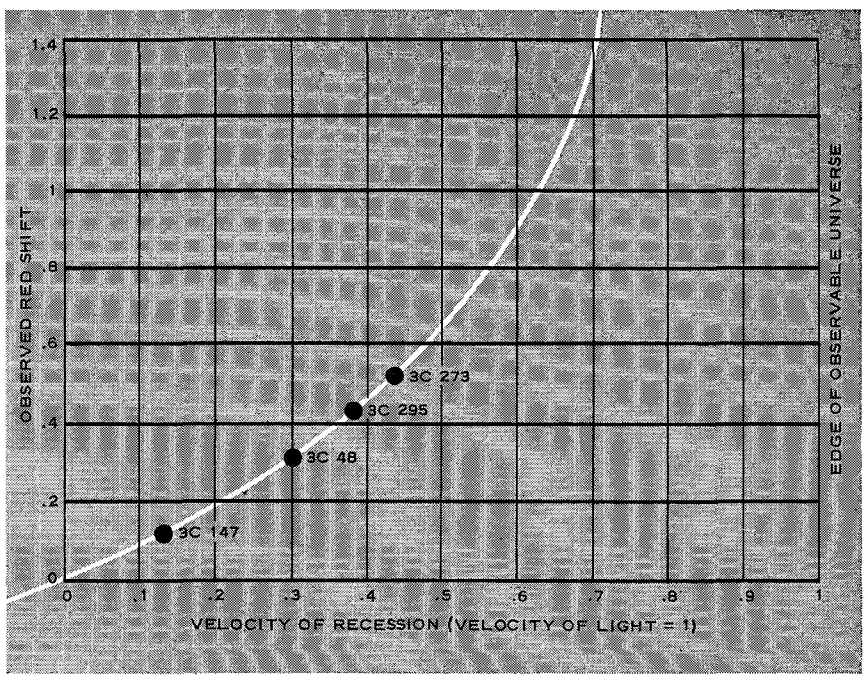
The simplest concept of space is the straightforward Euclidian idea, in which space is conceived of as an ordinary three-dimensional volume with linear dimensions: like an everyday room, but much larger and without walls. Euclidian space is open and infinite; it just goes on and on.

In the Nineteenth Century, the mathematicians Nikolai Lobachevski (Russia), Janos Bolyai (Hungary), and Bernhard Reimann (Germany) showed that non-Euclidian geometries are possible. Early in this century, Einstein predicted that space is curved, not Euclidian, because the gravitational effects due to stars and galaxies would tend to warp space, bend it. Cosmologists today accept the curved-space tenet. The question is, which way does the curvature go?

If the curve is closed, like a sphere, then space is finite in extent. There is a limit to how much material you can put on—in?—the surface of a sphere. However, the curve may be open, perhaps like a saddle shape. In that case, space can be infinite.

By looking at the distribution of the farthest galaxies—including the quasars—astronomers hope to be able to determine the nature of the curvature of space. If the galaxies are sprinkled through the farthest reaches of space at about the same density they show close to the Milky Way, then space is probably Euclidian, open and infinite. If the destiny of galaxies is *lower* with distance, then space may have an open curvature, and still be infinite. If the galactic density is *higher* at the edges of observability, space may then be a closed curve, similar to a sphere, and be finite.

Even with the 200-inch Mount Palomar telescope and the additional aid of farther-probing radio instruments, the measurements of galactic densities at distances of several billion light-years are extremely marginal. The evidence on hand seems to indicate that the density of the galaxies is higher at these great distances. If true, this means that space is closed like a



Measured red-shifts and deduced velocities of recession for the four most distant quasi-stellar sources. Slope of the curve drawn through these remote galaxies indicates to cosmologists that galactic densities increase with distance, hence space is curved positively and is spheroidal. If this is true, then space is finite in extent but—like the surface of a sphere—has no boundaries.

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sphere. The universe is finite, and contains a limited amount of matter.

Assuming this to be correct, what can we deduce about the nature of space? We are all experts in spherical geometry, believe it or not. We live on a spheroidal surface. Straight lines drawn on the Earth's surface are in reality curved lines. If you drew a very large triangle on the ground and measured the sizes of its angles, they would not add up to 180°. They can't, not on a sphere. Now then, where is the end of the Earth's surface? There is none. A sphere may be closed and finite in extent, *but it has no boundaries.* Not if you are on its surface.

The surface of a sphere is like a Mobius strip. There's only one side, and no end to it. You can travel forever along a Mobius strip without ever reaching the end of the road. However, the Mobius strip is only two-dimensional. The Klein bottle is a three-dimensional topological wonder that has only one surface. There's no difference between inside and outside—an ant crawling along a Klein bottle will never find the end of it.

The same holds true for the Earth's surface. Ignoring trivialities like oceans and mountain chains, you can travel along the surface of our spheroidal planet forever without reaching a boundary. You might cross and recross your original path endlessly, but nowhere would there be a spot where you could not continue moving forward.

The nature of space, then, is similar to the surface of a sphere—topologically. It may not look like a sphere any more than a Klein bottle does. But it evidently *behaves* as a sphere does. No matter what bumps and kinks there are to space, it apparently closes back on itself, so that a traveler can continue going all around the universe time and again without reaching a boundary that will stop him. And travelers do hurry through space, constantly: photons of light and radio energy are hurtling through the universe carrying information that we can only imperfectly decipher.

Now to return to our original question: How small is the universe?

The cosmologists look on the higher-galactic-density observations as lending strong weight to the Big Bang theory. Steady State theory demands that galactic density remain essentially unchanged no matter where in the universe you look.

But perhaps both theories are entirely wrong. Perhaps the universe is hoodwinking us—perhaps we are in a sort of celestial Hall of Mirrors, trick mirrors, with funny twists to them.

What has the observational evidence—the raw data now, without interpretation—shown us so far? Simply that some billion or so galaxies have been photographed, and the faintest of these objects are called galaxies only by deduction. Also, the fainter the galaxy, the more its spectrum is shifted toward the red.

As for the theoretical work, it has been shown that space is curved and non-Euclidian. Some very marginal observational evidence lends support to the idea that the curvature is closed, and space resembles a sphere, topologically.

Remember, when we refer to a spheroidal space, we are considering only the surface of the spheroid. All our universe exists on this surface only, just as all the words on this page exist only on its surface. The term "spheroid" is used loosely, simply to denote a closed surface that is finite in extent but without boundaries.

Considering these points only, we have no idea of the relationship between the number of galaxies and the size of the sphere. Do the galaxies fill space to its maximum extent? Is this space, therefore, expanding to make room for more galaxies? Or are the galaxies simply a small conglomeration of matter in a sphere that is tremendously larger, and mostly empty?

Until the actual radius of the universe can be measured in some manner, these questions will go unanswered. But consider this possibility:

What happens to the light emanating from a galaxy? For example, let us consider the light given off by our own Milky Way galaxy.

Our galaxy beams out some 10^{44} ergs/sec of visible light, we have seen. In addition, about 10^{38} ergs/sec of radio energy are given off by the Milky Way, a negligible factor when compared to the optical energy.

This energy spreads out in all directions through space, carried by photons of various wave lengths. Now let us narrow our field of view somewhat, and examine a single packet of photons as it speeds across space at the velocity of light.

If space is truly spheroidal, then the photons should travel around this spheroid and return to their place of origin. The length of time it takes to circumnavigate the universe depends, of course, on the circumference of the spheroid. And during their trip, the photons would be subjected to many outside forces: the gravitational pulls of galaxies, the absorption effects of intergalactic gas—if any exists, and there is strong evidence now that it does—anomalous curvatures within the only-roughly spheroidal curvature of the universe.

When the photons arrive back at their point of origin, they would not resemble the original packet very closely. Most of the original group would have been absorbed or scattered. The survivors would probably be shifted toward the red, because of the gravitational drags encountered during the circumnavigation.

The degree of attrition and red shift of the photons would depend on the length of their journey . . . in other words, on the very size of the universe. Once the photons returned to their point of origin they would not necessarily stop. They would continue on another spin around the universe, especially if the Milky Way had moved in the meantime, and was not in a position to absorb the photons or scatter them. And so the photon-packet would continue, round and round and . . .

Sir Arthur Eddington considered such a problem in his book, "The Expanding Universe." He showed that,

continued on page 93

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THE PROPHET OF DUNE

FRANK HERBERT

Part One of Five Parts

Paul Atreides was, theoretically Duke of Dune World—but he had the rest of the Empire against him, and the harsh and terrible world-desert of Dune World to lick before he could hope to claim his heritage!

Illustrated by John Schoenherr

I

Now, you will read how the Prophet Muad'Dib met his concubine, Chani-daughter-of-Liet. It happened many years ago on Arrakis (Oh, Holy Place!) when Muad'Dib was only Paul Atreides.

The Prophet Muad'Dib, as you know, was born on Caladan. He went to the planet Arrakis with his parents, Duke Leto and Lady Jessica, while still in his teens.

When Duke Leto took over his new planetary fief, Arrakis was not as it is today. On the whole planet there was no body of water open to the skies! Even a few drops of water were precious. People hoarded their moisture in stillsuits that recycled the body's liquids.

At that time, the cities of Arrakis were only in the north, protected from the terrible sandblast storms by walls of deep basins and the mountains called Shield Wall. The central desert was a land of killer storms, giant worms and fierce Fremen bands raiding from their sietch-cave warrens.

Yet, Arrakis was then as it is today the only source in the universe of the spice, melange. This is the same spice you eat, although your spice is mixed with much cassia and cinnamon. You get only a small serving of the real spice because it is so costly and because, in spite of the fact that it gives us longer lives, it also is a semipoison that makes crippled addicts of many who use too much.

The only ones who can eat the pure spice poison are those who can change it within themselves—as do the Reverend Mothers—or those who drink the freshly changed spice liquor—and this, as you have seen, is a thing of extreme peril.

Why does anyone eat this poison or drink the drug liquor?

Truthsayers and Reverend Mothers of Bene Gesserit use it to gain their holy powers.

Navigators of the Spacing Guild use it to guide their great ships through Time and Space across the void.

Fremen use it in their most holy mysteries, but they can do this only because they have lived intimately with the spice all their lives and thus can tolerate it.

And, of course, you know it was the spice poison that gave Muad'Dib his strange powers of prophecy.

But you are going to read now about the 74th Year of Shaddam IV when Muad'Dib first went to Arrakis. At that time, the Mysteries and many other things that He *has revealed to us were still secret. The Lady Jessica, Bene Gesserit mother of Muad'Dib, didn't even know that her natural father was the Baron Vladimir Harkonnen, deadly enemy of the Atreides. (This is the aspect of the Great Mystery wherein the Prophet's blood carries the essence of both Good and Evil.)*

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The reign of Muad'Dib's father, Duke Leto, lasted less than a year before the Harkonnens and their legions of Sardaukar allies fell upon Arrakis and laid it waste, using treachery and giant cannon which had not been seen in human warfare since ancient times. As you know, they could use cannon because the few field-force body shields of Arrakis did not last long in the planet's storms.

Arrakis, then, was the Place and the Time for the trial of Muad'Dib. His father was dead, killed by the Harkonnens. The Atreides officers and troops had been killed or scattered. Even the great Mentat Master of Assassins Thufir Hawat who had served three generations of Atreides with his mind powers was among the missing.

From this depth climbed Paul-Muad'Dib, the Prophet known as Usul—which is to say "The Base of The Pillar". He stood one day on the spice sands of the central desert accompanied only by his mother. The Lady Jessica's powers were limited at this time because she carried Paul-Muad'Dib's unborn sister, Alia, whom you know as St. Alia of The Knife. Muad'Dib was then a Duke without fief at the age of fifteen, target of one of the biggest manhunts of all time, with a price of ten billion solaris on his head. His location was known in that moment to but one other person, his father's famous swordmaster, Duncan Idaho, who had fled across the desert to beg sanctuary with the Fremen for the young Duke.

"A Child's History of Muad'Dib"
By The Princess Irulan

"Now, Harkonnen shall kill Harkonnen," the Duke Paul Atreides whispered.

He had awakened shortly before nightfall, sitting up in the sealed and darkened stilltent he had pitched in a shallow desert basin. As he spoke, he heard the vague stirrings of his mother where she slept against the tent's opposite wall.

Paul glanced at the proximity detector on the floor, studying the dials illuminated in the blackness by phosphor tubes. Duncan Idaho had been gone more than sixteen hours. Soon, Paul knew, they'd have to assume Idaho had been captured and his knowledge torn from him. And very soon, they'd have to flee across the killer desert.

"It should be night soon," his mother said. "Why don't you lift the tent shades?"

Paul realized then that her breathing had been different for some time, that she had lain silent in the darkness until certain he was awake.

"Lifting the shades wouldn't help," he said. "There's been a storm. The tent's covered by sand. I'll dig us out soon."

"No sign of Duncan?"

"None."

Unconsciously, Paul rubbed at the ducal signet on his thumb, fighting to contain the sense of urgent waiting. The new understanding of his prescience had loaded him with a weight of years far beyond his age. All the possible futures that fanned out from this point-event called "now"—all the personal lifetimes he had experienced in one burst of drug-induced clarity—had filled him with ruthless wisdom. He felt that he had never experienced childhood, but had sprung forth an old adult here on this wasteland planet of Arrakis.

Duncan Idaho, his father's trusted lieutenant, was out on the surface of the planet now, searching down one of those world-lines of the future, seeking a bolt hole in which a young fugitive Duke could hide.

Out on the surface.

A sudden rage against this planet which had helped kill his father set Paul trembling.

"I heard the storm begin," Jessica said.

An undemanding emptiness in her words helped restore some of his calm. But now his mind focused on the storm. He had seen in through the transparent end of their stilltent. First, cold dribbles of sand crossing the basin, then runnels and tails furrowing the sky. He had looked up to a rock spire, seen it change shape, become a low cheddar-colored wedge under the blast. Sand had funneled into their basin, covered the tent.

Tent bows had creaked once as they accepted the weight—then dark silence broken only by the faint bellows-wheezing of their sand snorkel cycling air from the surface.

"Try the receiver again," Jessica said.

Paul came out of his musing, said: "No use."

He found his stillsuit's watertube in its clip at his neck, drew a warm swallow, flat and tasteless, into his mouth. And he thought that here he truly began an Arrakeen existence—living on reclaimed moisture from his own breath and body.

Jessica heard Paul drinking, felt the slickskin of her own stillsuit clinging to her body. But she refused to accept her thirst. That would require awakening fully into the necessities of Arrakis.

So much easier to drift back into sleep.

But there had been a dream in this day's sleep. She shivered at memory of it. Her dreaming hands had tried to write "Duke Leto Atreides" in flowing sand. But the first letter had filled with sandflow before the last was begun.

The sand would not stop.

There had been wailing. Then she was in a saddle, her feet in wild stirrups, riding a runaway tiger in a formless land.

That ridiculous wailing.

In part of her dreaming mind she had recognized the sound—her own voice as a tiny child, crying for a woman not quite visible to memory . . . a woman who had gone away.

My unknown mother, Jessica thought. *The Bene Gesserit who bore me for the Sisters. Was she glad to rid herself of a Harkonnen brat?*

"We'll hit them in the spice," Paul said.

"An entire planet full of spice?" she asked.

"Sea power and air power ruled Caladan," he said.

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"Here it's *desert power*. And Fremen are the key to that."

How can he think of attack at a time like this? she asked herself. She heard him stirring, the sound of their pack being dragged across the tent floor.

"Here in the desert's where the spice is mined," he said. "When we find the Fremen . . ."

His voice came from the vicinity of the tent's sphincter. Her Bene Gesserit training sensed in his tone an unresolved bitterness toward her.

All his life he has been trained to hate Harkonnens, she thought. *Now, he finds he is Harkonnen . . . because of me. How little he knows me! I was my Duke's only woman. I accepted his life and his values even to defying my Bene Gesserit orders. They wanted a daughter to inbreed to a Harkonnen, but I bore a son because my Duke wanted an heir. Well . . . I'm carrying the daughter now, but little good it'll do them. I am Arteides.*

The tent's glowtab came alight under Paul's hand, filled the domed area with green radiance. Paul crouched at the sphincter, his stillsuit hood adjusted for the open desert—forehead capped, mouth filter in place, nose plugs adjusted. Only his dark eyes were visible: a narrow band of face that turned once toward her and away.

"Secure yourself for the open," he said, and his voice was blurred behind the filter.

Jessica pulled the filter across her mouth, began adjusting her hood as she watched Paul break the tent seal.

Sand rasped as she opened the sphincter and a burred fizzle of grains ran into the tent before he could immobilize it with a static compaction tool. A hole grew in the sandwall before him as the tool realigned the sand grains. He slipped out and her ears followed his progress to the surface.

What will we find out there? she wondered. *Harkonnen troops and the Sardaukar, those are dangers we can expect. But what of the dangers we don't know?*

She thought of the compaction tool and the many other strange instruments in the pack given to them for their escape. Each of these odd tools suddenly stood in her mind as a sign of mysterious dangers here.

"Pass up the pack." It was Paul's voice, low and guarded.

She felt then a hot breeze from surface sand touch her cheeks where they were exposed above the filter. She heard a nightbird call outside and knew Paul had opened a way to the surface.

Pass up the pack.

She moved to obey, heard the water literjons in the pack gurgle as she pushed them across the floor. *The sphincter.* She peered upward past the curve of escape hole not filled by the pack, saw Paul framed against stars.

"Here," he said and reached down, pulled the pack to the surface.

Now, she saw only the circle of stars. They were like the luminous tips of weapons aimed down at her. A shower of meteors crossed her patch of night. They made her think of the words from the Kitab al-Ibar, the semi-religious instruction manual enclosed with the desert survival pack.

"*A column of smoke by day, a pillar of fire by night.*"

That was the way Fremen sent warnings of peril across the desert. The meteor shower came through to her like that warning, like tiger stripes, like luminous grave slats clabbering her blood. She felt then the chill of the price on their heads.

"Hurry up," Paul said. "I want to collapse the tent."

A shower of sand from the surface brushed her left hand. *How much sand will the hand hold?* she asked herself. *How long for the sand to run through my fingers?*

"Shall I help you?" Paul asked.

"No."

She swallowed in a dry throat, slipped into the hole, felt static-packed sand rasp under her hands. Paul reached down, took her arm. She stood beside him on a smooth patch of starlighted desert, stared around. Sand almost brimmed their basin, leaving only a dim lip of surrounding rock. She probed the farther darkness with her trained senses.

Noise of small animals.

Birds.

A fall of dislodged sand and faint creature sound within it.

Paul collapsing their tent, recovering it up the hole.

Starlight displaced just enough of the night to charge each shadow with menace. She looked at patches of blackness.

Black is a blind remembering, she thought. *You listen for pack sounds, for the cries of those who hunted your ancestors in a past so ancient only your most primitive cells remember. The ears see. The nostrils see.*

Presently, Paul stood beside her, said: "Duncan told me, if he was captured, he could hold out . . . this long. We must leave here now." He shouldered the pack, crossed to the shallow lip of the basin, climbed to a ledge that looked down on open desert.

Jessica followed automatically, noting how she now lived in her son's orbit.

For now is my grief heavier than the sands of the seas, she thought. *This world has emptied me of all but the oldest purpose: tomorrow's life. I live now for my young Duke and the daughter yet to be.*

She felt the sand drag her feet as she climbed to Paul's side.

He looked north across a line of rocks, studying a distant escarpment. The far away rock profile was like an ancient battleship of the seas outlined by stars, the long swish of it lifted on an invisible wave, syllables of boomerang antennae, funnels arcing back, a pi-shaped upthrusting at the stern.

An orange glare burst above the sillhouette and a line of brilliant purple cut downward toward the glare.

Another line of purple!

And another upthrusting orange glare!

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It was like an ancient naval battle, remembered shell-fire, and the sight held them staring.

"Pillars of fire," Paul whispered.

A ring of red eyes lifted over the distant rock. Lines of purple laced the sky.

"Jetflares and lasguns," Jessica said.

The dust-reddened first moon of Arrakis lifted above the horizon to their left and they saw a storm trail there—a ribbon of movement over the desert.

"It must be Harkonnen 'thopters hunting us," Paul said. "The way they're cutting up the desert . . . it's as though they were making certain they stamped out whatever's there . . . the way you'd stamp out a nest of insects."

"Or a nest of Atreides," Jessica said.

"We must seek cover," Paul said. "We'll head south and keep to the rocks. If they caught us in the open . . ." He turned, adjusting the pack to his shoulders. "They're killing anything that moves."

He took one step along the ledge and, in that instant, heard the low hiss of gliding aircraft, saw the dark shapes of ornithopters above them.

II

My father once told me that respect for the truth comes close to being the basis for all morality. "Something cannot emerge from nothing," he said. This is profound thinking if you understand how unstable "the truth" can be.

"Conversations With Muad'Dib"
by The Princess Irulan

"I've always prided myself on seeing things the way they truly are," Thufir Hawat said. "That's the curse of being a Mentat. You can't stop analyzing your data."

The leathered old face appeared composed in the predawn dimness as he spoke. His sapho-stained lips were drawn into a straight line with creases spreading upward.

A robed man squatted silently on sand across from Hawat, apparently unmoved by the words.

The two were beneath a rock overhang that looked down on a wide, shallow sink. Dawn was spreading over the shattered outline of cliffs across the basin, touching everything with pink. It was cold under the overhang, a dry and penetrating chill left over from the night. There had been a warm wind just before dawn, but now it was cold. Hawat could hear teeth chattering behind him among the few troopers remaining in his force.

The man squatting across from Hawat was a Fremen who had come across the sink in the first light of false dawn, skittering over the sand, blending into the dunes, his movements barely discernible.

The Fremen extended a finger to the sand between them, drew a figure there. It looked like a bowl with an arrow spilling out of it. "There are many Harkonnen patrols," he said. He lifted his finger, pointed upward across the cliffs that Hawat and his men had descended.

Hawat nodded.

Many patrols. Yes.

But still he did not know what this Fremen wanted and this rankled. Mentat training was supposed to give a man the power of seeing motives.

This had been the worst night of Hawat's life. He had been at Tsimpo, a garrison village, buffer outpost for the former capitol city, Carthag, when the reports of attack began arriving. At first, he'd thought: *It's a raid. The Harkonnens are testing.*

But the report followed report—faster and faster.

Two legions landed at Carthag.

Five legions attacking the Duke's main base at Arrakeen.

A legion at Arsunt.

Two battle groups at Splintered Rock.

Then the reports became more detailed—there were Imperial Sardaukar among the attackers—possibly two legions of them. And it became clear that the invaders knew precisely which weight of arms to send where. Precisely! Superb intelligence.

Hawat's shocked fury had mounted until it threatened the smooth functioning of his Mentat capabilities. The size of the attack struck his mind like a physical blow.

Now, hiding beneath a bit of desert rock, he nodded to himself, pulled his torn and slashed tunic around him to ward off the cold shadows.

The size of the attack.

He had always expected their enemy to hire an occasional lighter from the Guild for probing raids. That was an ordinary enough gambit in this kind of House-to-House warfare. Lighters landed and took off on Arrakis regularly to transport the spice for House Atreides. Hawat had taken precautions against random raids by false spice lighters.

But there were more than two thousand ships down on Arrakis at the last count—not just lighters, but frigates, scouts, monitors, crushers, troop carriers, dump-boxes . . .

The entire spice income of Arrakis for fifty years might just cover the cost of such a venture.

It *might.*

I underestimated what the Baron was willing to spend in attacking us, Hawat thought. *I failed my Duke.*

Then there was the matter of the traitor.

I will live long enough to see her strangled! he thought. *I should've killed that Bene Gesserit witch when I had the chance.* There was no doubt in his mind who had betrayed them—the Lady Jessica. She fitted every available fact.

"Your man Gurney Halleck and part of his force are safe with our smuggler friends," the Fremen said.

"Good."

So Gurney will get off this hell planet. We're not all lost.

Hawat glanced back at the huddle of his men. He had started the night just past with three hundred of his finest. Of those, an even twenty remained and half of them wounded. Some of them slept now, standing up, leaning against the rock, sprawled on the sand beneath. Their

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last 'thopter, the one they'd been using as a ground-effect machine to carry their wounded, had given out just before dawn. They had cut it up with lasguns and hidden the pieces, then worked their way down into this hiding place at the edge of the basin.

Hawat had only a rough idea of their location—some two hundred kilometers southeast of Arrakeen. The main traveled ways between the Shield Wall sietch communities were somewhere south of them.

The Fremen across from Hawat threw back his hood and stillsuit cap to reveal sandy hair and beard. The hair was combed straight back from a high, thin forehead. He had the unreadable total blue eyes of the spice diet. Beard and mustache were stained at one side of the mouth, his hair matted there by pressure of the looping catchtube from his nose plugs.

The man removed the plugs, readjusted them. He rubbed at a scar beside his nose.

"If you cross the sink here this night," the Fremen said, "you must not use shields. There is a break in the wall"—he turned on his heels, pointed south—"there, and it is open sand down to the erg. Shields will attract a . . ." He hesitated. ". . . Worm. They don't often come in here, but a shield will bring one every time."

He said worm, Hawat thought. *He was going to say something else. What? And what does he want of us?*

Hawat sighed.

He could not recall ever before being this tired. It was a muscle weariness his pills were unable to ease.

Those damnable Sardaukar!

With a self-accusing bitterness, he faced the thought of the soldier-fanatics and the Imperial treachery they represented. His own Mentat assessment of the data told him how little chance he had ever to present evidence of the treachery before the High Council of the Landsraad where justice might be done.

"Do you wish to go to the smugglers?" the Fremen asked.

"Is it possible?"

"The way is long."

"Fremen don't like to say no," Idaho had told him once.

Hawat said: "You haven't yet told me whether your people can help my wounded."

"They are wounded."

The same answer every time!

"We know they're wounded!" Hawat snapped. "That's not the—"

"Peace, friend," the Fremen cautioned. "What do your wounded say? Are there those among them who can see the water needs of your tribe?"

"We haven't talked about water," Hawat said. "We—"

"I can understand your reluctance," the Fremen said. "They are your friends, your tribesmen. Do you have water?"

"Not enough."

The Fremen gestured to Hawat's tunic, the skin exposed beneath it. "You were caught in-sietch, without your suits. Now you must make a water decision, friend."

"Can we hire your help?"

The Fremen shrugged. "You have no water." He glanced at the group behind Hawat. "How many of your wounded would you spend?"

Hawat fell silent, staring at the man. He could see as a Mentat that their communication was out of phase. Word-sounds were not being linked up here in the normal manner.

"I am Thufir Hawat," he said. "I can speak for my Duke. I will make promissory commitment now for your help. I wish a limited form of help, preserving my force long enough only to kill a traitor who thinks herself beyond vengeance."

"You wish our siding in a vendetta?"

"The vendetta I'll handle myself. I wish to be freed of responsibility for my wounded that I may get about it."

The Fremen scowled. "How can you be responsible for your wounded? They are their own responsibility. The water's at issue, Thufir Hawat. Would you have me take that decision away from you?"

The man put a hand to a weapon concealed beneath his robe.

Hawat tensed, wondering: *Is there betrayal here?*

"What do you fear?" the Fremen demanded.

These people and their disconcerting directness! Hawat spoke cautiously: "There's a price on my head."

"Ahhhh." The Fremen removed hand from weapon. "You think we have Byzantine corruption. You don't know us, Thufir Hawat. The Harkonnens have not water enough to buy the smallest child among us."

But they had the price of Guild passage for more than two thousand fighting ships, Hawat thought. And the size of that price still staggered him.

"We both fight Harkonnens," Hawat said. "Should we not share the problems and ways of meeting the battle issue?"

"We are sharing," the Fremen said. "I have seen you fight Harkonnens. You are good. There've been times I'd have appreciated your arm beside me."

"Say where my arm may help you," Hawat said.

"Who knows?" The Fremen asked. "There are Harkonnen forces everywhere. But you still have not made the water decision or put it to your wounded."

I must be cautious, Hawat told himself. *There's too much here that's not understood.*

He said: "Will you show me your way, the Arrakeen way?"

"Strange thinking," the Fremen said, and there was a sneer in his tone. He pointed to the northwest across the clifftops. "We watched you come across the sand last night." He lowered his arm. You keep your force on the slipface of the dunes. Bad. You have no stillsuits, no water. You will not last long."

"The ways of Arrakis don't come easily," Hawat said.

"Truth. But you've killed Harkonnens."

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"What do you do with your own wounded?" Hawat demanded.

"Does a man not know when he is worth saving?" the Fremen asked. "Your wounded know you have no water." He tilted his head, looking sideways up at Hawat. "This is clearly a time for water decision. Both wounded and unwounded must look to the tribe's future."

The tribe's future, Hawat thought. *The tribe of Atreides. There's sense in that.* He forced himself to the question he had been avoiding.

"Have you word of my Duke or his son?"

Unreadable blue eyes stared upward into Hawat's. "Word?"

"Their fate!" Hawat snapped.

"Fate is the same for everyone," the Fremen said. "Your Duke, it is said, has met his fate. As to the Lisan al-Gaib, his son, that is in Liet's hands. Liet has not indicated."

I knew the answer without asking, Hawat thought.

He glanced at his men. They were all awake now. They had heard. They were staring out across the sand, the realization in their expressions: there was no returning to Caladan for them, and now Arrakis was lost.

Hawat turned back to the Fremen. "Have you heard of Duncan Idaho?"

"He was in the great house when the shield went down," the Fremen said. "This I've heard . . . no more."

She dropped the shield and let in the Harkonnens, he thought. *I was the one sat with my back toward a door. How could she do this when it meant turning also against her own son? But . . . who knows how a Bene Gesserit witch thinks . . . or if you can call it thinking?*

Hawat tried to swallow in a dry throat. "When will you know for sure . . . about the boy?"

"We know little of what happens in the cities," the Fremen said. He shrugged. "Who can tell?"

"You have ways of finding out?"

"Perhaps." The Fremen rubbed at the scar beside his nose. "Tell me, Thufir Hawat, do you have knowledge of the big weapons the Harkonnens used?"

The artillery, Hawat thought bitterly. *Who could have guessed they'd use artillery when they knew we had shields?*

"You refer to the artillery they used to trap our people in the caves," he said. "I've . . . theoretical knowledge of such weapons."

"Any man who retreats into a cave which has only one opening deserves to die," the Fremen said.

"Why do you ask about these weapons?"

"Liet wishes it."

"Then you should just go take one," Hawat sneered.

"Yes," the Fremen said. "We took one. We have hidden it where Stilgar can study it for Liet and where Liet can see it for himself if he wishes. But I doubt he'll want to: the weapon is not a very good one. Poor design for Arrakis."

"You . . . took one?" Hawat asked.

"It was a good fight," the Fremen said. "We lost only two men and spilled the water from more than a hundred of theirs."

There were Sardaukar at every gun, Hawat thought. *This desert madman speaks casually of losing only two men against Sardaukar!*

"We would not have lost the two except for those others fighting beside the Harkonnens," the Fremen said. "Some of those are good fighters."

One of Hawat's men limped forward, looked down at the squatting Fremen. "Is he talking about Sardaukar?"

"He's talking about Sardaukar," Hawat said.

"Sardaukar!" the Fremen said, and there was the sound of glee in his voice. "Ahhhh, so that's what they are. This was a good night indeed. Sardaukar. Which legion? Do you know?"

"We . . . don't know," Hawat said.

"Sardaukar," the Fremen mused. "Yet they wear Harkonnen clothing. Is that not strange?"

"The Emperor doesn't wish it known he fights against a Great House," Hawat said.

"But *you* know they are Sardaukar."

"Who am I?" Hawat asked bitterly.

"You are Thufir Hawat," the man said in a matter of fact tone. "We would've learned about the Sardaukar in time. We've sent three of them captive to be questioned by Liet's men."

Hawat's aide spoke slowly, disbelief in every word. "You . . . *captured* Sardaukar?"

"Only three of them," the Fremen said.

If only we'd had time to link up forces with these Fremen, Hawat thought. It was a sour lament in his mind. *If only we could've trained them and armed them. Great Mother what a fighting force we'd have had!*

"Perhaps you delay because of worry about the Lisan al-Gaib," the Fremen said. "If he's truly the Lisan al-Gaib, harm cannot touch him. Don't spend thought on such a matter when it's not yet proved."

"I serve the . . . Lisan al-Gaib," Hawat said. "His welfare is my chief concern. I've pledged myself to this."

"You are pledged to his water?"

Hawat glanced at the aide, who still was staring at the Fremen, returned his attention to the squatting figure. "To his water, yes."

"You wish to return to Arrakeen, to the place of his water?"

"To . . . yes, to the place of his water."

"Why did you not say at first this was a water matter?" The Fremen stood up, seated his nose plugs firmly, refastened his hood.

With a tired shrug, Hawat's aide returned to the other men. Hawat heard a low-voiced conversation arise among them.

The Fremen said: "There's always a way to water."

Behind Hawat, a man cursed. Hawat's aide called: "Thufir! Arkie just died."

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The Fremen put a fist to his ear. "The bond of water! It's a sign!" He stared at Hawat. "We've a place nearby for accepting the water. Shall I call my men?"

The aide returned to Hawat's side, said: "Thufir, some of the men left wives in Arrakeen. The men are . . . well, you know how it is at a time like this."

The Fremen still held fist to ear. "Is it the bond of water, Thufir Hawat?" he demanded.

Hawat's mind was racing. He sensed now the direction of the Fremen's motives, but feared the reaction of the tired men under the rock overhang when they understood.

"The bond of water," Hawat said.

"Let our tribes join," the Fremen said and lowered the fist.

As though that were the signal, four more Fremen slid and dropped from the rocks above. They darted back under the overhang, rolled the dead man in a loose robe, lifted him and began running with him along the cliff wall to the right. Spurts of dust lifted around their running feet.

It was over before Hawat's tired men could gather their wits. The Fremen with the body hanging like a sack in its enfolding robe were gone around a turn in the cliff. Only the leader remained.

One of Hawat's men shouted: "Where they going with Arkie?"

"They're taking him to . . . bury him," Hawat said quietly.

"Fremen don't bury their dead!" the man barked. "Don't try your tricks on us, Thufir. We know what these people do. Arkie was one of us. He . . ."

"Paradise we're sure for a man who dies in the service of the Lisan al-Gaib," the Fremen said. "If it's the Lisan al-Gaib you serve as you've said it, why raise mourning cries? The memory of one who died in this fashion will live as long as the memory of man endures."

But Hawat's men advanced looking angry and desperate. One held a captured lasgun half drawn from its holster.

"Stop right there!" Hawat barked. He fought down the sick fatigue that gripped his muscles. "These Fremen respect our dead. Customs differ, but the meaning's the same."

"They'll render Arkie down for his water," the man with the lasgun snarled.

"Is it that your men wish to attend the ceremony?" the Fremen asked.

He doesn't even see the problem, Hawat thought. The naïvete of the Fremen was frightening.

"They're concerned for a respected comrade," Hawat said.

"We'll treat your comrade with the same reverence we treat our own," the Fremen said. "This is the bond of water. We know the rites. A man's flesh is his own; the water belongs to the tribe."

Hawat spoke quickly as the man with the lasgun advanced another step. "Will you now help our wounded?"

"One doesn't question the bond," the Fremen said. "We'll do for you what a tribe does for its own. First, we must get all of you suited and see to the necessities."

The man with the lasgun hesitated.

Hawat's aide said: "Are we buying their help with Arkie's . . . water?"

"Not buying," Hawat said. "We've merged our forces."

"Customs differ," one of the men muttered.

Hawat began to relax.

"They'll help us get to Arrakeen?" the man with the lasgun asked.

"We'll kill Harkonnens," the Fremen said, grinning. "And Sardaukar." He stepped backward, cupped his hands beside his ears and tipped his head back, listening. Presently, he lowered his hands, said: "Aircraft comes. Conceal yourselves beneath the rock and remain motionless."

At a gesture from Hawat his men obeyed.

The Fremen pressed Hawat back with the others, said: "We'll fight in the time of fighting." He reached beneath his robes, brought out a tiny cage, lifted a creature from it.

Hawat recognized a bat. It turned its head, revealing eyes as total blue as the Fremen's.

The Fremen stroked the bat, soothing it, crooning. He bent over the animal's head, allowed a drop of saliva to fall from his tongue into the bat's upturned mouth. The bat stretched its wings, remained quietly on the opened hand. The man took a tiny tube, held it beside the bat's head, chattered into the tube; then, lifting the creature high, he threw it upward.

The bat swooped away across the basin, was lost to sight.

The Fremen folded the cage, returned it beneath his robe. Again, he bent his head, listening. "They quarter the high country," he said. "One wonders who they seek there."

"It's known we retreated in this direction," Hawat said.

"One shouldn't presume one is the sole object of a hunt," the Fremen said. "Watch across the basin. You'll see a thing."

Time passed.

Some of Hawat's men stirred, whispering.

"Remain silent as frightened animals," the Fremen hissed.

Hawat discerned movement near the opposite cliff—flitting blurs of tan on tan.

"My little friend carried the message," the Fremen said. "He is a good messenger—day or night."

The movement across the sink faded away. On the entire four to five kilometer expanse of sand nothing remained but the growing pressure of the day's heat—blurred columns of rising air.

"Be most silent," the Fremen whispered.

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A file of plodding figures emerged from a break in the opposite cliff, headed directly across the sink. To Hawat, they appeared to be Fremen, but a curiously inept band. He counted six men making heavy going of it over the dunes.

The *thwok-thwok* of ornithopter wings sounded high to the right behind Hawat. He saw the craft come over the cliff wall above him—an Atreides 'thopter with Harkonnen battle colors daubed on it. The 'thopter swooped toward the men crossing the basin.

The exposed Fremen stopped on a dune crest and waved.

The 'thopter circled once over them in a tight curve, came back for a dust-shrouded landing in front of the Fremen. Five men swarmed from the aircraft. Hawat saw the dust-repellent shimmer of shields and, in the men's motions, the hard competence of Sardaukar.

"Aiihh!" the Fremen beside Hawat hissed. "They use their stupid shields. He glanced toward the open south wall of the sink.

"They're Sardaukar," Hawat whispered.

"Good."

The Sardaukar approached the waiting Fremen in an enclosing half circle. Sun glinted on blades held ready. The Fremen stood in a compact group, apparently indifferent.

Abruptly, the sand around the Sardaukar erupted Fremen. They were at the ornithopter, in it. Where the two groups met on the dune crest, a dust cloud partly obscured violent motion.

The dust settled and only Fremen remained standing.

"They left only three men in their 'thopter," said the Fremen beside Hawat. "Fortunate. I don't believe we damaged the craft in taking it."

Behind Hawat, one of his men whispered: "Those were Sardaukar!"

"Did you notice how well they fought?" the Fremen asked.

Hawat took a deep breath, smelled the burned dust around them, felt the heat, the dryness. In a voice matched to that dryness he said: "Yes, they fought well."

The captured 'thopter took off with a lurching flap of wings, angled upward to the south in a steep, wing-tucked climb.

So the Fremen can handle 'thopters, too, Hawat thought.

On the distant dune, a Fremen waved a square of green cloth.

"More come!" the Fremen beside Hawat barked. "Be ready. I'd hoped to have us away without more inconvenience."

Inconvenience! Hawat thought.

Two more 'thopters were stooping now from high in the west onto an area of sand abruptly devoid of visible Fremen. Only eight splotches of blue—the dead Sardaukar in Harkonnen uniforms—remained to be seen.

Another 'thopter glided over the cliff wall above Hawat. He drew in a sharp breath as he saw it—a big troop carrier. It flew with slow, spread-wing heaviness of a full load like a giant bird coming to its nest.

On the open sand, purple fingers of lasgun beams flicked from one of the diving 'thopters. They laced across the sand raising sharp dust trails.

"Cowards!" the Fremen beside Hawat rasped.

The troop carrier settled toward the patch of blue-clad bodies. Its wings crept out to full reach, began the cupping action of a quick stop.

Hawat's attention was caught by a flash of sun on metal to the south—a 'thopter there plummeting in power dive, wings folded flat against its sides, its jet a golden flare against the dark silvered gray of the sky. It plunged like an arrow toward the troop carrier which was unshielded because of the lasgun activity around it. Straight into the carrier the diving 'thopter plunged.

A flaming roar shook the basin. Rocks tumbled from the cliff walls all around. A geyser of red-orange shot skyward from the sand where the carrier and its companion 'thopters had been—everything there caught in the flame.

It was the Fremen who took off in that captured 'thopter, Hawat thought. *Deliberately sacrificed himself to get that carrier. Great Mother! What* are *these Fremen?*

"A reasonable exchange," said the Fremen beside Hawat. "There must've been three hundred men in that carrier. We must see to their water now and make plans to get other aircraft." He started to step out of their rock-shadowed concealment.

A rain of blue uniforms came over the cliff wall in front of him, falling in low-suspensor slowness. In the flashing instant Hawat had time to see they were Sardaukar, hard faces set in battle frenzy, that they were unshielded and each carried a knife in one hand, a stunner in the other.

A thrown knife caught Hawat's Fremen companion in the throat, hurling him backward, twisting, face down. Hawat had only time to draw his own knife before blackness of a stunner projectile dropped him.

III

Muad'Dib could see the future, but you must understand the limits of his power. Think of sight. You have eyes, yet cannot see without light. From the valley floor, you cannot see beyond the mountain. Thus, Muad'Dib could not always choose to look across that mysterious terrain called Time. Yet, he had looked there—down world lines and life lines without number. He is to be thought of as many people in one flesh. Do not doubt him when he says: "Much kindness is the beginning of cruelty." He has seen beyond the actions, and he tells us: "The vision of Time is a broad prospectus, but when you pass through it, Time is a narrow door. The Future balances on a delicate and painful edge. Yet, one cannot

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choose the clear, safe course through this many-placed door. Security leads always down to stagnation."

"Arrakis Awakening"
by The Princess Irulan

As the ornithopters glided out of the night above them, Paul grabbed his mother's arm, snapped: "Don't move!"

Then he saw the lead craft in the moonlight, the way its wings cupped to brake for landing, the reckless dash of the hands at the controls.

"It's Idaho," he said.

The aircraft settled into the basin like a covey of birds coming to nest. Idaho was out and running toward them before the dust settled. Two Fremen-robed figures followed. Paul recognized one: the tall, sandy-bearded Liet-Kynes, the planetologist who had gone native here.

Behind Kynes, other Fremen were throwing fabric covers over the ornithopters. The craft became a row of shallow dunes.

Idaho skidded to a stop in front of Paul, saluted. "M'Lord, the Fremen have a temporary hiding place nearby where we . . ."

"What about that back there?"

Paul pointed to the violence above the distant cliff—the jet flares, the purple beams of lasguns lacing the desert.

A rare smile touched Idaho's round, placid face. "M'Lord . . . Sire, I've left them a little sur . . ."

Glaring white light filled the desert—bright as a sun, etching their shadows onto the rock floor of the ledge. In one sweeping motion, Idaho had Paul's arm in one hand, Jessica's shoulder in the other, hurling them down off the ledge into the basin. They sprawled together in the sand as the roar of an explosion thundered over them. Its shock wave tumbled chips off the rock ledge they had vacated.

Idaho sat up, brushed sand from himself.

"That's the surprise," he said.

"Not the Family atomics!" Jessica said. "I thought . . ."

"You planted a shield back there," Paul said.

"A big one turned to full force," Idaho said. "A lasgun beam touched it and . . ." he shrugged.

"Subatomic fusion," Jessica said. "That's a dangerous weapon."

"Not weapon, M'Lady, defense. That scum will think twice before using lasguns another time."

The Fremen from the ornithopters stopped above them. One called in a low voice: "We should get under cover, friends."

Paul got to his feet as Idaho helped Jessica up.

"That blast *will* attract considerable attention, Sire," Idaho said.

Sire, Paul thought.

The word had such a strange sound when directed at him. Sire had always been his father.

He felt himself touched briefly by prescience, saw himself infected by Terrible Purpose, the wild Race Consciousness that was moving the human universe toward chaos. He glimpsed the future, saw down the fanned out world lines the *jihad*, the religious war with his own legions of soldier-fanatics raging across the universe behind the green and black Atreides banner.

The vision left him shaken.

He allowed Idaho to guide him as they followed the Fremen along the basin's edge to a rock projection. Other Fremen were there opening a way down into the native rock.

The way the rock was opened made Paul think of the threshold barrier that had just opened to permit him a new view into more possible lives. He had gained new experiences. In a few seconds, he had become many lifetimes "older."

"May I take your pack, Sire?" Idaho asked.

"It's not heavy, Duncan," Paul said.

"You've no body shield," Idaho said. "Do you wish mine?" He glanced at the distant cliffs. "Not likely there'll be more lasgun activity.

"Your right arm is shield enough for me, Duncan."

Jessica saw the praise take effect, how Idaho moved closer to Paul, and she thought: *Such a sure way with people he has.*

The Fremen removed a rock plug, opened a passage down into the desert's complex. A camouflage cover was rigged for the opening.

"Follow me," a Fremen said and led the way down.

Behind them, the cover blotted out the moonlight. A green glow came alive ahead, revealing steps and rock walls. Robed Fremen were all around them now. They rounded another corner, stepped out into a rough cave chamber.

Kynes stood before them, jubba hood thrown back, the neck of his stillsuit glistening in the green light. His long hair and beard were mussed. The blue eyes without whites were darkness under heavy brows.

In the moment of encounter, Kynes wondered at himself: *Why am I helping these people? It's the most dangerous thing I've ever done. It could doom me with them.*

Then he looked squarely at Paul, seeing the boy who had taken on the mantle of manhood, masking grief, suppressing all except the position that must be assumed now—the Dukedom. And Kynes realized in that moment the Dukedom did still exist, in spite of the Padishah Emperor's treachery, in spite of the Harkonnens. It existed solely because of this youth and his training—and this was not a thing to be taken lightly.

Jessica glanced once around the chamber, registering it on her senses in the Bene Gesserit Way—a laboratory, a civil place full of angles and squares in the ancient manner.

"This is one of the Imperial Ecological Testing Stations my father wanted as advance bases," Paul said.

His father wanted! Kynes thought.

And again Kynes wondered at himself. *Am I foolish to aid these fugitives? Why am I doing it? It'd be so*

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easy to take them now, to buy the Harkonnen trust with them.

Paul followed his mother's example, gestalting the room, seeing the workbench down one side, the walls of featureless rock. Instruments lined the bench—dials glowing, wire gridex planes with fluting glass emerging from them. An ozone smell permeated the place.

Some of the Fremen moved on around a concealing angle in the chamber and new sounds started there—machine coughs, the whinnies of spinning belts and multi-drives.

Paul looked to the end of the room, saw cages with small animals in them stacked against the wall.

"You've recognized this place correctly," Kynes said. "For what would you use such a place, Paul Atreides?"

"To make this planet a fit place for humans," Paul said.

Perhaps that's why I help them, Kynes thought.

The machine sounds abruptly hummed away to silence. Into this void there came a thin animal squeak from the cages. It was cut off abruptly as though in embarrassment.

Paul returned his attention to the cages, saw that the animals were bats, flying creatures. An automatic feeder extended from the side wall across the cages.

A Fremen emerged from the hidden area of the chamber, spoke to Kynes: "Liet, the field-generator equipment is not working. I am unable to mask us from proximity detectors."

"Can you repair it?" Kynes asked.

"Not quickly. The parts . . ." The man shrugged.

"Yes," Kynes said. "Then we'll do without machinery. Get a hand pump for air out to the surface."

"Immediately." The man hurried away.

Kynes turned back to Paul. "You gave a very good answer."

Jessica marked the easy rumble of the man's voice. It was a *royal* voice, accustomed to command. She had not missed the reference to him as Liet, either. The stories were true, then. Liet was the alter ego, the other face of the tame planetologist.

"We're most grateful for your help, Dr. Kynes," she said.

"Hm-m-m, we'll see," Kynes said. He nodded to one of his men. "Spice coffee in my quarters, Shamir."

"At once, Liet," the man said.

Kynes indicated an arched opening in a side wall of the chamber. "If you please."

Jessica allowed herself a regal nod before accepting. She saw Paul give a hand signal to Idaho, telling him to mount guard outside this passage.

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The passage, two paces deep, opened through a heavy door into a square office lighted by golden glowglobes. Jessica passed her hand across the door as she entered, was startled to identify plasteel.

Paul stepped three paces into the room, dropped his pack to the floor. He heard the door close behind him, studied the place—about eight meters to a side, walls of natural rock, curry-colored, broken by metal filing cabinets on their right. A low desk with milk glass top shot full of yellow bubbles occupied the room's center. Four suspensor chairs ringed the desk.

Kynes moved around Paul, held a chair for Jessica. She sat down, noting the way her son examined the room. The working of his mind now, these new powers so apparent in him and their sudden onset, instilled a fear in her that she could not fully understand.

Jessica remembered the day on far away Caladan when the old Reverend Mother Gaius Helen Mohiam had tested Paul in the Bene Gesserit Way, threatening him with death from the poison needle of the *gom jabbar*. The Reverend Mother had sensed the strangeness of the boy then, even allowed the possibility he could be the long sought Kwisatz Haderach, the one who could be many places at once.

If he's the one we've sought, Jessica wondered, *why do I fear him? He's my son!*

Paul remained standing for another eyeblink. A faint anomaly in the room's air currents told him there was a secret exit to their right behind the filing cabinets.

"Will you sit down, Paul Atreides?" Kynes asked.

How carefully he avoids my title, Paul thought. But he accepted the chair, remained silent while Kynes sat down.

"You sense that Arrakis could be a paradise," Kynes said. "Yet, as you see, the Imperium sends here only its trained hatchetmen, its seekers after the spice!"

Paul held up his thumb with its Ducal signet. "Do you see this ring?"

"Yes."

"Do you know its significance?"

Jessica turned sharply to stare at her son.

"Your father lies dead in the ruins of Arrakeen," Kynes said. "You are technically the Duke."

"I'm a soldier of the Imperium," Paul said, "*technically* a hatchetman."

Kynes face darkened. "Even with the Emperor's Sardaukar standing over your father's body?"

"The Sardaukar are one thing, the legal source of my authority is another," Paul said.

"Arrakis has its own way of determining who wears the mantle of authority," Kynes said.

And Jessica, turning back to look at him, thought: *There's steel in this man that no one has taken the temper out of . . . and we've need of steel. Paul's doing a dangerous thing.*

Paul said: "The Sardaukar on Arrakis are a measure of how much our beloved Emperor feared my father. Now, *I* will give the Padishah Emperor reasons to fear the . . ."

"Lad," Kynes said, "there are things you don't . . ."

"You will address me as Sire or My Lord," Paul said.

Gently, Jessica thought.

Kynes stared at Paul, and Jessica noted the glint of admiration in the planetologist's face, the touch of humor there.

"Sire," Kynes said.

"I am an embarrassment to the Emperor," Paul said. "I am an embarrassment to all who would divide Arrakis as their spoil. As I live, I shall continue to be such an embarrassment that I stick in their throats and choke them to death!"

"Words," Kynes said.

Paul stared at him. Presently, Paul said: "You have a a legend of the Lisan al-Gaib here, the Voice From The Outer World, the one who will lead the Fremen to paradise. Your men have . . ."

"Superstition!" Kynes said.

"Perhaps," Paul agreed. "Yet, perhaps not. Superstitions sometimes have strange roots and stranger branchings."

"You have a plan," Kynes said. "This much is obvious . . . Sire."

"Could your Fremen provide me with proof positive that the Sardaukar are here in Harkonnen uniform?"

"Quite likely."

"The Emperor will put a Harkonnen back in power here," Paul said. "Perhaps even Beast Rabban. Let him. Once he has involved himself beyond escaping his guilt, let the Emperor face the possibility of a Bill of Particulars laid before the Landsraad. Let him answer there where . . ."

"Paul!" Jessica said.

"Granted that the Landsaard High Council accept your case," Kynes said, "there could be only one outcome: general warfare between the Imperium and the Great Houses."

"Chaos," Jessica said.

"But I'd present my case to the Emperor," Paul said, "and give him an alternative to chaos."

Jessica spoke in a dry tone: "Blackmail?"

"One of the tools of statecraft, as you've said yourself," Paul said, and Jessica heard the bitterness in his voice. "The Emperor has no sons, only daughters."

"You'd aim for the throne?" Jessica asked.

"The Emperor will not risk having the Imperium shattered by total war," Paul said. "Planets blasted, disorder everywhere—he'll not risk that."

"This is a desperate gamble you propose," Kynes said. "What do the Great Houses of the Landsraad fear most?" Paul asked. "They fear most what is happening here right now on Arrakis—the Sardaukar picking them off one by one. That's why there *is* a Landsraad. This is the glue of the Great Convention. Only in union do they match the Imperial forces."

"But they're . . ."

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"This is what they fear," Paul said. "Arrakis would become a rallying cry. Each of them would see himself in my father—cut out of the herd and killed."

Kynes spoke to Jessica: "Would his plan work?"

"I'm no Mentat," Jessica said.

"But you are Bene Gesserit."

She shot a probing stare at him, said: "His plan has good points and bad points . . . as any plan would at this stage. A plan depends as much upon execution as it does upon concept."

"Law is the ultimate science," Paul quoted. "Thus it reads above the Emperor's door. I propose to show him law."

"And I'm not sure I could trust the person who could conceive your plan," Kynes said. "Arrakis has its own plan that we . . ."

"From the throne," Paul said, "I could make a paradise of Arrakis with the wave of a hand. This is the coin I offer for your support."

Kynes stiffened. "My loyalty's not for sale, *Sire*."

Paul stared across the desk at him, meeting the cold glare of those blue-within-blue eyes, studying the bearded face, the commanding appearance. A harsh smile touched Paul's lips and he said calmly: "Well spoken. And I apologize."

Kynes met Paul's stare and, presently, said: "No Harkonnen ever admitted error. Perhaps you're not like them, Atreides."

"It could be a fault in their education," Paul said.

Hearing the acid in Paul's tone, Jessica wondered what Kynes reaction would be were he to learn that Harkonnen blood flowed in Paul's veins.

"You ask me to commit myself to you totally?" Kynes asked.

"You say you're not for sale," Paul said, "but I believe I've the coin you'll accept. For your loyalty I offer *my* loyalty to you . . . totally."

My son has the Atreides sincerity, Jessica thought. *He has that tremendous, almost naïve honor—and what a powerful force that truly is.*

She saw that Paul's words had shaken Kynes.

"This is nonsense," Kynes said. "You're just a boy and . . ."

"I'm a Duke," Paul said. "I'm an Atreides. No Atreides has ever broken such a bond."

Kynes swallowed.

"When I say totally," Paul said, "I mean without reservation. I would give my life for you."

"Sire!" Kynes said, and the word was torn from him, but Jessica saw that he was not speaking now to a boy of fifteen, but to a man, to a superior. Now, Kynes meant the word.

In this moment he'd give his life for Paul, she thought. *How do the Atreides accomplish this thing so quickly, so easily?*

"I know you mean this," Kynes said. "Yet the Harkon . . ."

The door behind Paul slammed open. He whirled to see reeling violence—shouting, the clash of steel, wax-image faces grimacing in the passage.

With his mother beside him, Paul leaped for the door, seeing Idaho blocking the passage, his blood-pitted eyes there visible through a shield blur, claw hands beyond him, arcs of steel chopping futilely at the shield. There was the orange fire-mouth of a stunner repelled by the shield. Idaho's blades were through it all, flicking-flicking, red dripping from them.

Then Kynes was beside Paul and they forced the door closed.

Paul had one last glimpse of Idaho standing against a swarm of Harkonnen uniforms—his jerking, controlled staggers, the black goat hair with a red blossom of death in it. Then the door was closed and there came a snick as Kynes threw the bolts.

"I appear to've decided," Kynes said.

"Someone detected your machinery before it was shut down," Paul said. He pulled his mother away from the door, met the despair in her eyes.

"I should've suspected trouble when the coffee failed to arrive," Kynes said.

"You've a bolt hole out of here," Paul said. "Shall we use it?"

Kynes took a deep breath, said: "This door should hold for at least twenty minutes against everything but a lasgun."

"They'll not use a lasgun for fear we've shields on this side," Paul said.

"Those were Sardaukar in Harkonnen uniform," Jessica whispered.

They could hear pounding on the door now, rhythmic blows.

Kynes indicated the cabinets against the right-hand wall, said: "This way." He crossed to the first cabinet, opened a drawer, manipulated a handle within it. The entire wall of cabinets swung open to expose the black mouth of a tunnel. "This door also is plasteel," Kynes said.

"You were well prepared," Jessica said.

"We lived under the Harkonnens for eighty years," Kynes said. He herded them into the darkness, closed the door.

In the sudden blackness, Jessica saw a luminous arrow on the floor ahead of her.

Kynes' voice came from behind them: "We'll separate here. This wall is tougher. It'll stand for at least an hour. Follow the arrows like that one on the floor. They'll be extinguished by your passage. They lead through a maze to another exit where I've secreted a 'thopter. There's a storm across the desert tonight. Your only hope is to run for that storm, dive into the top of it, ride with it. My people have done this in stealing 'thopters. If you stay high in the storm, you'll survive."

"What of you?" Paul asked.

"I'll try to escape another way. If I'm captured . . .

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well, I'm still Imperial Planetologist. I can say I was your captive."

Running like cowards, Paul thought. *But how else can I live to avenge my father?* He turned to face the door.

Jessica heard him move, said: "Duncan's dead, Paul. You saw the wound. You can do nothing for him."

"I'll take full payment for all of these one day," Paul said.

"Not unless you hurry now," Kynes said.

Paul felt the man's hand on his shoulder.

"Where will we meet, Kynes?" Paul asked.

"I'll send the Fremen searching for you. The storm's path is known. Hurry now, and the Great Mother give you speed and luck."

They heard him go, a scrambling in the blackness.

Jessica found Paul's hand, pulled him gently. "We must not get separated," she said.

"Yes."

He followed her across the first arrow, seeing it go black as they touched it. Another arrow beckoned ahead.

They crossed it, saw it extinguish itself, saw another arrow ahead.

They were running now.

Plans within plans within plans within plans, Jessica thought. *Have we become part of someone else's plan now?*

The arrows led them around turnings, past side openings dimly sensed in the faint luminescence. Their way slanted first downward then up and up. They came finally to steep steps, rounded a corner and were brought short by a glowing wall with a dark handle visible in its center.

Paul pressed the handle.

The wall swung away. Light flared to reveal a rock-hewn cavern with an ornithopter squatting in its center. A gray wall with a doorsign on it loomed in front of the aircraft.

"Where did Kynes go?" Jessica asked.

"He did what any good guerrilla leader would," Paul said. "He split us into two parties and arranged that he couldn't reveal where we are if he's captured. He won't really know."

Paul drew her into the room, noted how their feet kicked up dust.

"No one's been here for a long time," he said.

He released her hand, crossed to the ornithopter's left door, opened it and secured his pack in the rear. "Proximity mask on this ship," he said. "Kynes is thorough. The instrument panel has remote controls for door and lights."

Jessica leaned against the craft's opposite side, catching her breath.

"The Harkonnens will have a covering force over this area," she said. She consulted her direction sense, pointed right: "The storm's that way."

Paul nodded, fighting an abrupt reluctance to move. He knew its source, knew he had to overcome it. Somewhere this night he had passed a decision-nexus. He had taken a turning into the deep unknown. He knew the Time-region surrounding him, but his now-point existed in a state of suspension. It was as though he had gone down into a deep valley. Countless paths led upward out of the valley and some of them might carry him over and into a real future . . . but many would not.

Now, he could only rely on his training and the numberless experiences of the possible through which he had lived in prescience.

"The longer we wait the better prepared they'll be," Jessica said.

"Get in and strap yourself down," he said.

He joined her in the ornithopter, absorbing with a sense of shock the realization that the more reliance he placed on prescient "memory," the weaker he became during a real-time emergency. He must rely instead on the weight of experience his prescience gave him and deal with the "now" from a position of immediate ability.

"If you rely only on your eyes, your other senses weaken," went the Bene Gesserit axiom. He took it to himself now, promising never again to fall into such a trap.

Paul fastened his safety harness, saw that his mother was secured, checked the aircraft. Its wings were at full spread, their delicate metal interleavings fanned to the extreme. He touched the retractor, watched the wings shorten for jet takeoff the way Gurney Halleck had taught him. Instrument dials came alive as he touched the starter. The turbines hissed.

"Here we go," he said.

He touched the light control. Darkness blanketed them.

His hand was a shadow against luminous dials as he tripped the remote control for the door. Grating sounded. A cascade of sand swished away to silence ahead of them. A dusty breeze touched Paul's cheeks. He closed his door, feeling the sudden pressure.

A wide patch of dust-blurred stars framed in angular darkness appeared where the door-wall had been. Starlight defined a shelf beyond, a suggesting of sand ripples.

Paul depressed the glowing action-sequence switch on his panel. The wings snapped back and down, hurling the 'thopter out of its nest. Power surged from the jetpods as the wings locked into lift attitude.

They came out over rocks, silver-frosted angles and outcroppings in the starlight. The dust-reddened second moon showed itself above the horizon to their right, defining the ribbon trail of the storm.

Paul's hands danced over the controls. Wings snicked in to become beetle stubs. G-force pulled at their flesh as the craft came around in a tight bank.

"Jetflares behind us!" Jessica said.

"I saw them."

He slammed the power arm full forward.

The 'thopter leaped like a frightened animal beneath them, surged southwest toward the storm and the great

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curve of desert. In the near distance, Paul saw scattered shadows telling where the line of rocks ended, the basement complex sinking beneath the dunes. Beyond, stretched moonlighted fingernail shadows—dunes diminishing one into another.

And above the horizon climbed the flat immensity of the storm like a wall against the stars.

Something jarred the 'thopter.

"Shellburst!" Jessica gasped. "They're using some kind of projectile weapon."

She saw a sudden animal grin on Paul's face. "They seem to be avoiding their lasguns," he said.

"But we have no shields!"

"Do they know that?"

Again the 'thopter shuddered.

Paul twisted to peer back. "Only one of them appears to be fast enough to keep up with us."

He returned his attention to their course, watching the storm wall grow high in front of them. It loomed like a tangible solid there.

"Projectile launchers, rockets, all the ancient weaponry—that's one thing we'll give the Fremen," Paul whispered.

"The storm," Jessica said. "Hadn't you better turn?"

"What about the ship behind us?"

"He's pulling up."

"Now!"

Paul stubbed the wings as tightly as they would go, banked hard left into the deceptively slow boiling of the storm wall, felt his cheeks pull in the G-force.

They appeared to glide into a slow clouding of dust that grew heavier and heavier until it blotted out the desert, the moon, all external shape. The aircraft became a long, horizontal whisper of darkness lighted only by the green luminosity of the instrument panel.

Through Jessica's mind flashed all the warnings about such storms—that they cut metal like butter, etched flesh to bones and ate away the bones. She felt the buffeting of dust-blanketed wind. It twisted them as Paul fought the controls. She saw him chop the power, felt the ship buck. The metal around them hissed and trembled.

"Sand!" Jessica shouted.

She saw the negative shake of his head in the light from the panel. "Not much sand this high."

But she could feel them sinking deeper into the maelstrom.

Paul sent the wings to their full soaring length, heard them creak with the strain. He kept his eyes fixed on the instruments, gliding by instinct, fighting for altitude.

The sound of their passage diminished.

The 'thopter began rolling off to the left. Paul focused on the glowing globe within the attitude curve, fought his craft back to level flight.

Jessica had the eerie feeling that they were standing still, that all motion was external. A vague tan flowing against the windows, a rumbling hiss reminded her of the powers around them.

Winds to seven or eight hundred kilometers an hour, she thought. Adrenalin edginess began to gnaw at her. *I must not fear,* she told herself, mouthing the words of the Bene Gesserit litany. *Fear is the mind-killer.*

Slowly, her long years of training prevailed.

Calmness returned.

"We have the tiger by the tail," Paul whispered. "We can't go down, can't land . . . and I don't think I can lift us out of this. We'll have to ride it out."

Calmness poured out of her. Jessica felt her teeth chattering, clamped them together. Then she heard Paul's voice low and controlled reciting the litany:

"Fear is the mind-killer. Fear is the little death that brings total obliteration. I will face my fear. I will permit it to pass over me and through me. And when it has gone past me I will turn to see fear's path. Where the fear has gone there will be nothing. Only I will remain."

IV

What do you despise? By this are you truly known.
"Manual of Muad'Dib"
by The Princess Irulan

"They are dead, Baron," said Iakin Nefud, the guard captain. "Both the woman and the boy are certainly dead."

The Baron Vladimir Harkonnen sat up in the sleep suspensors of his private quarters. Beyond these quarters and enclosing him like a multi-shelled egg stretched the space frigate he had grounded on Arrakis as command post in the planet's subjugation. Here in his quarters, though, the ship's harsh metal was disguised with draperies, with fabric paddings and rare art objects.

"It is a certainty," the guard captain said. "They are dead."

The Baron shifted his gross body in the suspensors, focused his attention on a statue of a leaping boy in a niche across the room. Sleep faded from him. He straightened the padded suspensor beneath the fat folds of his neck, stared across the single glowglobe of his bedchamber to the doorway where Captain Nefud stood blocked by the pentashield.

"They're certainly dead, Baron," the man repeated.

The Baron noted the trace of *semute* dullness in Nefud's eyes. It was obvious the man had been deep within the drug's rapture when he received this report, and had stopped only to take the antidote before rushing here.

"I have a full report," Nefud said.

Let him sweat a little, the Baron thought. *One must always keep the tools of statecraft sharp and ready. Power and fear—sharp and ready.*

"Have you seen their bodies?" the Baron rumbled.

Nefud hesitated.

"Well?"

"M'Lord . . . they were seen to dive into a sandstorm . . . winds over eight hundred kilometers. Nothing survives such a storm, M'Lord. Nothing! One of our own craft was destroyed in the pursuit."

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The Baron stared at Nefud, noting the nervous twitch in the scissor line of the man's jaw muscles, the way the chin moved as Nefud swallowed.

"You have seen the bodies?" the Baron asked.

"M'Lord . . ."

"For what purpose do you come here rattling your armor?" the Baron roared. "To tell me a thing is certain when it is not? Do you think I'll praise you for such stupidity, give you another promotion?"

Nefud's face went bone pale.

Look at that chicken, the Baron thought. *I am surrounded by such useless clods. If I scattered sand before this creature and told him it was grain, he'd peck at it.*

"The man Idaho led us to them, then?" the Baron asked.

"Yes, M'Lord!"

Look how he blurts out his answer, the Baron thought. He said: "They were attempting to flee to the Fremen, eh?"

"Yes, M'Lord."

"Is there more to this . . . report?"

"The Imperial Planetologist, Kynes, is involved, M'Lord. Idaho joined this Kynes under mysterious circumstances . . . I might even say *suspicious* circumstances."

"So?"

"They . . . ahh, fled together to a place in the desert where it's apparent the boy and his mother were hiding. In the excitement of the chase, several of our groups were caught in a lasgun-shield explosion."

"How many did we lose?"

"I'm . . . ahh, not sure yet, M'Lord."

He's lying, the Baron thought. *It must've been bad.*

"The Imperial lackey, this Kynes," the Baron said. "He was playing a double game, eh?"

"I'd stake my reputation on it, M'Lord."

His reputation!

"Have the man killed," the Baron said.

"M'Lord! Kynes is the *Imperial* Planetologist, His Majesty's own serv . . ."

"Make it look like an accident, then!"

"M'Lord, there were Sardaukar with our forces in the subjugation of this Fremen nest. They have Kynes in custody now."

"Get him away from them. Say I wish to question him."

"If they demur?"

"They will not if you handle it correctly."

Nefud swallowed. "Yes, M'Lord."

"The man must die," the Baron rumbled. "He tried to help my enemies."

Nefud shifted from one foot to the other.

"Well?"

"M'Lord, the Sardaukar have . . . two persons in custody who might be of interest to you. They've caught the Duke's Master of Assassins."

"Hawat? Thufir Hawat?"

"I've seen the captive myself, M'Lord. 'Tis Hawat."

"I'd not've believed it possible!"

"They say he was knocked out by a stunner, M'Lord. In the desert where he couldn't use his shield. He's virtually unharmed. If we can get our hands on him, he'll provide great sport."

"This is a Mentat you speak of," the Baron growled. "One doesn't waste a Mentat. Has he spoken? What does he say of his defeat? Could he know the extent of . . . but no."

"He has spoken only enough, M'Lord, to reveal his belief that the Lady Jessica was his betrayer."

The Baron sank back, thinking; then: "You're sure? It's the Lady Jessica who attracts his anger?"

"He said it in my presence, M'Lord."

"Let him think she's alive, then."

"But, M'Lord . . ."

"Be quiet. I wish Hawat treated kindly. He must be told nothing of the late Dr. Yueh, his true betrayer. Let it be said that Yueh died defending his Duke. In a way, this may even be true. We will, instead, feed his suspicions against the Lady Jessica."

"M'Lord, I don't . . ."

"The way to control and direct a Mentat, Nefud, is through his information. False information—false results."

"Yes, M'Lord, but . . ."

"Is Hawat hungry? Thirsty?"

"M'Lord, Hawat's still in the hands of the Sardaukar!"

"Yes. Indeed, yes. But the Sardaukar will be as anxious to get information from Hawat as I am. I've noticed a thing about our allies, Nefud. They're not very devious . . . politically. I do believe this is a deliberate thing; the Emperor wants it that way. Yes. I do believe it. You will remind the Sardaukar commander of my renown at obtaining information from reluctant subjects."

Nefud looked unhappy. "Yes, M'Lord."

"You will tell the Sardaukar commander that I wish to question both Hawat and this Kynes at the same time, playing one off against the other. He can understand that much, I think."

"Yes, M'Lord."

"And once we have them in our hands . . ." The Baron nodded.

"M'Lord, the Sardaukar will want an observer with you during any . . . questioning."

"I'm sure we can produce an emergency to draw off any unwanted observers, Nefud."

"I understand, M'Lord. That's when Kynes can have his accident."

"Both Kynes and Hawat will have accidents then, Nefud. But only Kynes will have a real accident. It's Hawat I want. Yes. Ah, yes."

Nefud blinked, swallowed. He appeared about to ask a question, but remained silent.

"Hawat will be given both food and drink," the Baron

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said. "Treated with kindness, with sympathy. In his water you will administer the residual poison developed by the late Piter de Vries. *And* you will see that the antidote becomes a regular part of Hawat's diet from this point on . . . unless I say otherwise."

"The antidote, yes." Nefud shook his head. "But . . ."

"Don't be dense, Nefud. The Duke almost killed me with a poison-capsule tooth. The gas he exhaled into my presence deprived me of my most valuable Mentat, Piter. I need a replacement."

"Hawat?"

"Hawat."

"But . . ."

"You're going to say Hawat's completely loyal to the Atreides. True, but the Atreides are dead. We will woo him. He must be convinced he's not to blame for the Duke's demise. It was all the doing of that Bene Gesserit witch. He had an inferior master, one whose reason was clouded by emotion. Mentats admire the ability to calculate without emotion, Nefud. We will woo the formidable Thufir Hawat."

"Woo him. Yes, M'Lord."

"Hawat, unfortunately, had a master whose resources were poor, one who could not elevate a Mentat to the sublime peaks of reasoning that are a Mentat's right. Hawat will see a certain element of truth in this. The Duke couldn't afford the most efficient spies to provide this Mentat with the required information." The Baron stared at Nefud. "Let us never deceive ourselves, Nefud. The truth is a powerful weapon. We know how we overwhelmed the Atreides. Hawat knows, too. We did it with wealth."

"With wealth. Yes, M'Lord."

"We will woo Hawat," the Baron said. "We will hide him from the Sardaukar. And we will hold in reserve . . . the withdrawal of the antidote for the poison. There's no way of removing the residual poison. And, Nefud, Hawat need never suspect. The antidote will not betray itself to a poison snooper. Hawat can scan his food as he pleases and detect no trace of poison."

Nefud's eyes opened wide with understanding.

"The absence of a thing," the Baron said, "this can be as deadly as the *presence*. The absence of air, eh? The absence of water? The absence of anything else we're addicted to." The Baron nodded. "You understand?"

Nefud swallowed. "Yes, M'Lord."

"Then get busy. Find the Sardaukar commander and set things in motion."

"At once, M'Lord." Nefud bowed, turned and hurried away.

Hawat by my side! the Baron thought. *The Sardaukar will give him to me. If they suspect anything at all, it's that I wish to destroy the Mentat. And this suspicion I'll confirm! The fools! One of the most formidable Mentats in all history, a Mentat trained to kill, and they'll toss him to me like some silly toy to be broken. I will show them what use can be made of such a toy.*

The Baron reached beneath a drapery beside his suspensor bed, pressed a button to summon his elder nephew, Rabban. He sat back, smiling.

And all the Atreides dead!

The stupid guard captain had been right, of course. Certainly, nothing survived in the path of a sandblast storm on Arrakis. Not an ornithopter . . . nor its occupants. The woman and the boy were dead. The bribes in the right places, the *unthinkable* expenditure to bring overwhelming military force down onto one planet . . . all the sly reports tailored for the Emperor's ears alone, all the careful scheming were here at last coming to full fruition.

Power and fear—fear and power!

The Baron could see the path ahead of him. One day, a Harkonnen would be Emperor. Not himself, and no spawn of his loins. But a Harkonnen. Not this Rabban he'd summoned, of course. But Rabban's youngest brother, young Feyd-Rautha. There was a sharpness to the boy that the Baron enjoyed . . . a ferocity.

A lovely boy, the Baron thought. *A year or two more—say, by the time he's seventeen, I'll know for certain whether he's the tool that House Harkonnen requires to gain the throne.*

"M'Lord Baron."

The man who stood outside the doorfield of the Baron's bedchamber was low-built, gross of face and body, with the Harkonnen paternal-line's narrow-set eyes and bulge of shoulders. There was yet some rigidity in his fat, but it was obvious to the eye that he'd come one day to the portable suspensors for carrying his excess weight.

A muscle-minded tank-brain, the Baron thought. *No Mentat, my nephew . . . not a Piter de Vries, but perhaps something more precisely devised for the task at hand. If I give him freedom to do it, he'll grind over everything in his path. Oh, how he'll be hated here on Arrakis!*

"My dear Rabban," the Baron said. He released the doorfield, but pointedly kept his body shield at full strength, knowing that the shimmer of it would be visible above the bedside glowglobe.

"You summoned me," Rabban said. He stepped into the room, flicked a glance past the air disturbance of the body shield, searched for a suspensor chair, found none.

"Stand closer where I can see you easily," the Baron said.

Rabban advanced another step, thinking that the *damnable* old man had deliberately removed all chairs, forcing a visitor to stand.

"The Atreides are dead," the Baron said. "The last of them. That's why I summoned you here to Arrakis. This planet is again yours."

Rabban blinked. "But I thought you were going to advance Piter de Vries to the . . ."

"Piter, too, is dead."

"Piter?"

"Piter."

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The Baron reactivated the doorfield, blanked it against all energy penetration.

"You finally tired of him, eh?" Rabban asked.

His voice fell flat and lifeless in the energy-blanketed room.

"I will say a thing to you just this once," the Baron rumbled. "You insinuate that I oblitered Piter as one obliterates a trifle." He snapped fat fingers. "Just like that, eh? I am not so stupid, nephew. I will take it unkindly of you if ever again you suggest by word or action that I am so stupid."

Fear showed in the squinting of Rabban's eyes. He knew within certain limits how far the old Baron would go against Family. Seldom to the point of death unless there were outrageous profit or provocation in it. But Family punishments could be painful.

"Forgive me, M'Lord Baron," Rabban said. He lowered his eyes as much to hide his own anger as to show subservience.

"You do not fool me, Rabban," the Baron said.

Rabban kept his eyes lowered, swallowed.

"I make a point," the Baron said. "Never obliterate a man unthinking, the way an entire fief might do it through some *due process of law*. Always do it for an overriding purpose—and *know your purpose!*"

Anger spoke in Rabban: "But you obliterated the traitor, Yueh! I saw his body being carried out as I arrived last night."

Rabban stared at his uncle, suddenly frightened by the sound of those words.

But the Baron smiled. "I'm very careful about dangerous weapons," he said. "Yueh was a traitor. He gave me the Duke." Strength poured into the Baron's voice. "*I* suborned a doctor of the Suk School! The *Inner* School! You hear, boy? But that's a wild sort of weapon to leave lying about. I certainly didn't obliterate him casually."

"Does the Emperor know you suborned a Suk doctor?"

That was a penetrating question, the Baron thought. *Have I misjudged this nephew?*

"The Emperor doesn't know it yet," the Baron said. "But his Sardaukar are sure to report it to him. Before that happens, though, I'll have my own report in his hands through CHOAM Company channels. I will explain that I *luckily* discovered a doctor who pretended to the conditioning. A false doctor, you understand? Since everyone *knows* you cannot counter the conditioning of a Suk School, this will be accepted."

"Ahhh, I see," Rabban murmured.

And the Baron thought: *Indeed, I hope you do see. I hope you do see how vital it is that this remain secret.* The Baron suddenly wondered at himself. *Why did I do that? Why did I boast to this fool nephew of mine—the nephew I must use and discard?* The Baron felt anger at himself. He felt betrayed.

"It must be kept secret," Rabban said. "I understand."

The Baron sighed. "I give you different instructions about Arrakis this time, nephew. When last you ruled this place, I held you in strong rein. This time, I have only one requirement."

"M'Lord?"

"Income."

"Income?"

"Have you any idea, Rabban, how much we spent to bring such military force to bear on the Atreides? Do you have even the first inkling of how much the Guild charges for military transport?"

"Expensive, eh?"

"Expensive!"

The Baron shot a fat arm toward Rabban. "If you squeeze Arrakis for every cent it can give us for sixty years, you'll just barely repay us!"

Rabban opened his mouth, closed it without speaking.

"Expensive," the Baron sneered. "The damnable Guild monopoly on space would've ruined us if I hadn't planned for this expense long ago. You should know, Rabban, that *we* bore the entire brunt of it. We even paid for transport of the Sardaukar."

"Income, then," Rabban said.

The Baron lowered his arm, made a fist. "You must squeeze."

"And I may do anything I wish as long as I squeeze?"

"Anything."

"The cannons you brought," Rabban said. "Could I . . ."

"I'm removing them," the Baron said.

"But you . . ."

"You won't need such toys. They were a special innovation and are now useless. We need the metal. They cannot go against a shield, Rabban. They were merely the unexpected. It was predictable that the Duke's men would retreat into cliff caves on this abominable planet. Our cannon merely sealed them in."

"The Fremen don't use shields."

"You may keep some lasguns if you wish."

"Yes, M'Lord. And I have a free hand."

"As long as you squeeze."

Rabban's smile was gloating. "I understand perfectly, M'Lord."

"You understand nothing perfectly," the Baron growled. "Let us have that clear at the outset. What you *do* understand is how to carry out my orders. Has it occurred to you that there are at least five million persons on this planet?"

"Does M'Lord forget that I was his regent here before? And if M'Lord will forgive me, his estimate may be low. It's difficult to count a population scattered among sinks and pans the way they are here. And when you consider the Fremen of . . ."

"The Fremen aren't worth considering!"

"Forgive me, M'Lord, but the Sardaukar believe otherwise."

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The Baron hesitated, staring at his nephew. "You know something?"

"M'Lord had retired when I arrived last night. I . . . ah, took the liberty of contacting some of my lieutenants from . . . ah, before. They've been acting as guides to the Sardaukar. They report that a Fremen band ambushed a Sardaukar force somewhere southeast of here and wiped it out."

"Wiped out a Sardaukar force?"

"Yes, M'Lord."

"Impossible!"

Rabban shrugged.

"Fremen defeating Sardaukar," the Baron sneered.

"I repeat only what was reported to me," Rabban said. "It is said this Fremen force already had captured the Duke's redoubtable Thufir Hawat."

"Ahhhhhh."

The Baron nodded, smiling.

"I believe the report," Rabban said. "You've no idea what a problem the Fremen were to me here."

"Perhaps, but these weren't Fremen your lieutenants saw. They must've been Atreides men trained by Hawat and disguised as Fremen. It's really the only possible answer."

Again, Rabban shrugged. "Well, the Sardaukar think they were Fremen. The Sardaukar already have launched a program to wipe out all Fremen."

"Good!"

"But . . ."

"It'll keep the Sardaukar occupied. And we'll soon have Hawat. I know it! I can feel it! Ahh, this has been a day! The Sardaukar off hunting a few useless desert bands while we get the real prize!"

"M'Lord . . ." Rabban hesitated, frowning. "I've always felt that we underestimated the Fremen, both in numbers and in . . ."

"Ignore them, boy! They're rabble. It's the populous towns, cities and villages that concern us. A great many people there, eh?"

"A great many, M'Lord."

"They worry me, Rabban."

"Worry you?"

"Oh . . . ninety per cent of them are of no concern. But there are always a few . . . Houses Minor and so on, people of ambition who might try a dangerous thing. If one of them should get off Arrakis with an unpleasant story about what happened here, I'd be most displeased. Have you any ideas how displeased I'd be?"

Rabban swallowed.

"You must take immediate measures to hold a hostage from each House Minor," the Baron said. "As far as anyone off Arrakis must learn, this was straightforward House-to-House battle. The Sardaukar had no part in it, you understand? The Duke was offered the usual quarter and exile, but he died in an unfortunate accident before he could accept. He was about to accept, though. That is the story. And any rumor that there were Sardaukar here, it must be laughed at."

"As the Emperor wishes it," Rabban said.

"As the Emperor wishes it."

"What about the smugglers?"

"No one believes smugglers, Rabban. They are tolerated, but not believed. At any rate, you'll be spreading some bribes in that quarter . . . and other measures which I'm sure you can think of."

"Yes, M'Lord."

"Two things from Arrakis, then, Rabban: income and a merciless fist. You must show no mercy here. Think of these clods as what they are—Scythians and Celts, slaves envious of their masters and waiting only the opportunity to rebel. Not the slightest vestige of pity or mercy must you show them."

"Can one exterminate an entire planet?" Rabban asked.

"Exterminate?" Surprise showed in the swift turning of the Baron's head. "Who said anything about exterminating?"

"Well, I presumed you were going to bring in new stock and . . ."

"I said *squeeze*, nephew, not exterminate. Don't waste the population, merely drive them into utter submission. You must be the carnivore, my boy." He smiled, a baby's expression in the dimple-fat face. "A carnivore never stops. Show no mercy. Never stop. Mercy is chimera. It can be defeated by the stomach rumbling its hunger, by the throat crying its thirst. You must be always hungry and thirsty." The Baron caressed his bulges beneath the suspensors. "Like me."

"I see, M'Lord."

Rabban swung his gaze left and right.

"It's all clear then, nephew?"

"Except for one thing, uncle: the Planetologist, Kynes."

"Ahh, yes, Kynes."

"He's the Emperor's man, M'Lord. He can come and go as he pleases. And he's very close to the Fremen . . . married one."

"Kynes will be dead by tomorrow's nightfall."

"That's dangerous work, uncle, killing an Imperial servant."

"How do you think I've come this far this quickly?" the Baron demanded. His voice was low, charged with unspeakable adjectives. "Besides, you need never have feared Kynes would leave Arrakis. You're forgetting that he's addicted to the spice."

"Of course!"

"Those who know will do nothing to endanger their supply," the Baron said. "Kynes certainly must know."

"I forgot," Rabban said.

They stared at each other in silence.

Presently, the Baron said: "Incidentally, you will make my own supply one of your first concerns. I've quite a stockpile of private stuff, but a suicide raid by the Duke's men got most of what we'd stored for sale."

Rabban nodded. "Yes, M'Lord."

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The Baron brightened. "Now, tomorrow morning, you will assemble what remains of organization here and you'll say to them: 'Our Sublime Padishah Emperor has charged me to take possession of this planet and end all dispute.' "

"I understand, M'Lord."

"This time, I'm sure you do. We will discuss it in more detail tomorrow. Now, leave me to finish my sleep."

The Baron deactivated his doorfield, watched his nephew out of sight.

A tank-brain, the Baron thought. *Muscle-minded tank-brain. They will be bloody pulp here when he's through with them. Then, when I send in Feyd-Rautha to take the load off them, they'll cheer their rescuer. Beloved Feyd-Rautha. Benign Feyd Rautha, the compassionate one who saves them from a beast. Feyd-Rautha, a man to follow and die for. The boy will know by that time how to oppress with impunity. I'm sure he's the one we need. He'll learn. And such a lovely body. Really, a lovely boy.*

V

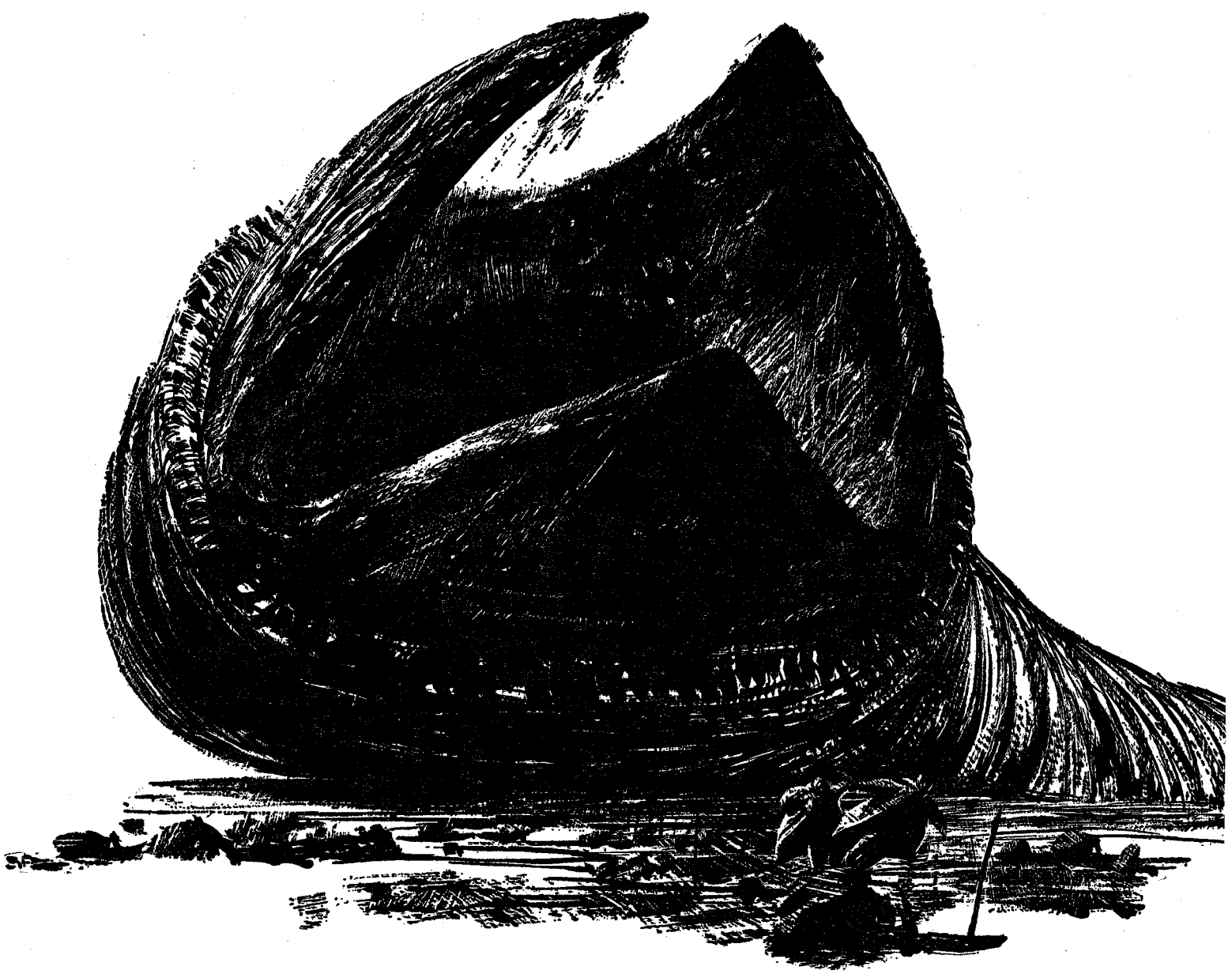
At the age fifteen, he already had learned silence.

"A Child's History of Muad'Dib"
by The Princess Irulan

As Paul fought the 'thopter's controls, he grew aware that he was sorting out the interwoven storm forces, his more-than-Mentat awareness computing on the basis of fractional minutae. He felt dust fronts, billowings, mixings of turbulence, an occasional vortex.

The cabin interior was an angry box lighted by the green radiance of instrument dials. The tan flow of dust outside appeared featureless, but his inner sense began to *see* through the curtain.

I must find the right vortex, he thought.



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For a long time now he had sensed the storm's power diminishing, but still it shook them. He waited out another turbulence.

The vortex began as an abrupt billowing that rattled the entire ship. Paul defied all fear to bank the 'thopter left.

Jessica saw the maneuver first on the attitude globe. "Paul!" she screamed.

The vortex turned them, twisting, tipping. It lifted the 'thopter like a chip on a geyser, spewed them up and out—a winged speck within a core of winding dust lighted by the second moon.

Paul looked down, saw the dust-defined pillar of hot wind that had disgorged them, saw the dying storm trailing away like a dry river into the desert—moon-gray motion growing smaller and smaller below as they rode the updraft.

"We're out of it," Jessica whispered.

Paul turned their craft away and out of the dust in swooping rhythm while he scanned the night sky.

"We've given them the slip," he said.

Jessica felt her heart pounding. She forced a return to calmness, stared at the diminishing storm. Her time sense told her they had ridden within that elemental force for almost four hours, but part of her mind computed it as a lifetime.

Like the litany, she thought. *We faced that force and did not resist. The storm passed through us and around us. It is gone, but we remain.*

"I don't like the sound of our wings," Paul said. "We took some damage."

He felt the grating, injured flight through his hands on the controls, and thought: *I am out of the storm, but I'm still not out into the full prescient future. This is still blind Time.* Yet he sensed himself trembling on the verge of revelation, as though the slightest push would tumble him into new awareness.

Paul shivered.

The inner sensation held magnetic terror, and he found himself caught on the puzzle of this trembling awareness. Cortical changes were taking place slowly and inexorably within him, he knew, as he absorbed the experiences of the possible future, as he *became* the lives he had lived. The spice-saturated diet played its part in the change. He knew this. But he felt also that he was a tool of the Bene Gesserit litany, that the words carried their own mystic power.

"I shall not fear . . ."

Cause and Effect. He was alive despite malignant forces and it could not have been without the litany's magic.

Words from the Orange Catholic Bible rang through his memory: *"What senses do we lack that we cannot see or hear another world all around us?"*

"There's rock all around," Jessica said. Paul focused on the 'thopter's lurching, shook his head to clear it. He looked around, saw uplifting rock shapes black on the sand ahead and to the right. He grew aware of wind around his ankles, stirring of dust in the cabin. There was a hole in the craft somewhere, more of the storm's damage.

"Try to set us down on sand," Jessica said. "The wings may not take full brake."

He gestured toward a place ahead where sandblasted ridges lifted into moonlight above the dunes. "I'll set us down near those rocks. Check your safety harness."

She obeyed, thinking: *We've water and stillsuits. Fremen live out here. What they can do we can do.*

"Run for those rocks the instant we're stopped," Paul said. "I'll bring the pack."

"Run for . . ." She fell silent, then: "Yes . . . the worms."

"Our friends, the worms," he corrected her. "They'll get this 'thopter. There'll be no trace of where we landed."

How ruthlessly direct his thinking is, she thought. And for the first time, she focused her attention in the full Bene Gesserit Way on the implications of the changes in Paul—the old-man maturity his actions reflected. She was suddenly terrified by the weight of infinite futures in his manner.

Their ornithopter glided lower. A rushing sense of motion dominated their passage—blurred shadows of dunes, rocks lifting like islands. The aircraft touched a dune top with a soft lurch, skipped a sand valley, touched another dune.

He's killing our speed against the sand, Jessica thought. And she permitted herself to admire his competence, letting this ease the fear of him.

"Brace yourself!" Paul warned.

He pulled back on the wing brakes, gently at first, then harder and harder. He felt them cup the air, their aspect ratio dropping faster and faster. Wind screamed through the lapped coverts and primaries of the wings' leaves.

Abruptly, with only the faintest lurch of warning, the left wing—weakened by the storm—twisted upward and inward, slamming across the side of the 'thopter. The craft skidded across a dune top, twisting to the left. It tumbled down the opposite face to bury its nose in the next dune amid a cascade of sand. They lay stopped on the broken wing side, the right wing pointing toward the stars.

Paul jerked off his safety harness, hurled himself upward across his mother, wrenching the door open. Sand poured around them into the cabin, bringing a dry smell of burned flint. He grabbed the pack from the rear, saw that his mother was free of her harness. She stepped up onto the side of the right-hand seat and out onto the 'thopter's metal skin. Paul followed, dragging the pack by its straps.

"Run!" he ordered.

He pointed up the dune face and beyond it where they could see a rock tower undercut by sandblast winds.

Jessica leaped off the 'thopter and ran, scrambling and

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sliding up the dune. She heard Paul's panting progress behind. They came out onto a sand ridge that curved away toward the rocks.

"Follow the ridge," Paul ordered. "It'll be faster."

They slogged toward the rocks, sand gripping their feet.

A new sound began to impress itself on them: a muted whisper, a hissing, an abrasive slithering.

"Worm," Paul said.

It grew louder.

"Faster!" Paul gasped.

The first rock shingle, like a beach slanting from the sand, lay no more than ten meters ahead when they heard metal crunch and shatter behind them.

Paul shifted his pack to his right arm, holding it by the straps. It slapped his side as he ran. He took his mother's arm with his other hand. They scrambled onto the lifting rock, up a pebble-littered surface through a twisted, wind-carved channel. Breath came dry and gasping in their throats.

"I can't run any farther," Jessica panted.

Paul stopped, pressed her into a gut of rock, turned and looked down onto the desert. A mound-in-motion ran parallel to their rock island—moonlighted ripples, sand waves, a cresting burrow almost level with Paul's eyes at a distance of about a kilometer. The flattened dunes of its track curved once—a short loop crossing the patch of desert where they had abandoned their wrecked ornithopter.

Where the worm had been there was no sign of the aircraft.

The burrow mound moved outward into the desert, coursed back across its own patch, questing.

"It's bigger than a Guild spaceship," Paul whispered. "I was told worms grew large in the deep desert, but I didn't realize . . . how big."

"Nor I," Jessica breathed.

Again, the thing turned out away from the rocks, sped now with a curving track toward the horizon. They listened until the sound of its passage was lost in gentle sand stirrings around them.

Paul took a deep breath, looked up at the moon-frosted escarpment, and quoted from the Kitab al-Ibar: "Travel by night and rest in black shade through the day." He looked at his mother. "We still have a few hours of night left. Can you go on?"

"In a moment."

Paul stepped onto the rock shingle, shouldered the pack, adjusted its straps. For a moment, he studied the paracompass.

"Whenever you're ready," he said.

She pushed herself away from the rock, testing her reservoir of returned strength. "South?"

"Yes. We'll stick to this ridge."

"Deeper into the desert," she said, and she thought: *We've a causeway through the worm-guarded sand.*

"The Fremen desert," Paul whispered.

He hesitated, shaken by remembered high-relief imagery out of a prescient vision from far away Caladan. He had looked out of the then/present onto Time's patterns and seen this desert. But the *set* of that vision had been subtly different. It was like an optical image that had disappeared into his consciousness, been absorbed by memory, and now failed of perfect registry when projected onto the real scene. The vision was shifted, as though it approached him from a different angle while he remained motionless.

Idaho was with us in that vision, he remembered. *Now, Idaho is dead.*

"Do you see a way to go?" Jessica asked.

"No," he said, "but we'll go anyway."

And again he cautioned himself to rely on the lessons learned from the infinite experiences of the future and not to put his confidence in the visions themselves.

This gave him a measure of confidence. He settled his shoulders in the pack, set out up a sand-carved channel in the rock. This opened onto a moonlighted rock floor with benched ledges climbing to the south.

Jessica followed as Paul clambered onto the first ledge.

She noted presently how their passage became a thing immediate and particular—the sand pockets between rocks where their steps were slowed, the wind-carved ridge that cut their hands, the obstruction that forced a choice: Go over or go around? The terrain enforced its own rhythms. They spoke only when necessary and then with the hoarse voices of their exertion.

"Be careful here—this ledge is very slippery with sand."

"Watch you don't hit your head against this overhang."

"Stay below this ridge; the moon's at our backs and it'd show our movement to anyone out there."

Paul stopped in a bight of rock, leaned the pack against a narrow ledge.

Jessica leaned beside him, thankful for the moment of rest. She heard Paul pulling at his stillsuit tube, sipped her own reclaimed water. It tasted brackish, and she remembered the waters of Caladan—a tall fountain enclosing a curve of sky, such a richness of moisture that it hadn't been noticed for itself . . . only for its shape, or its reflection, or its sound as she stopped beside it.

To stop, she thought. *To rest . . . truly rest.*

It occurred to her that mercy was the ability to stop, if only for a moment. There was no mercy where there could be no stopping.

Paul pushed away from the rock ledge, turned and climbed over a sloping surface. Jessica followed with a sigh.

They slid down onto a wide shelf that led around a sheer rock face. Again, they fell into the disjointed rhythm of movement across this broken land.

Jessica felt that the night was dominated by degrees of smallness in substances beneath their feet and hands—

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boulders or pea gravel or flaked rock or pea sand or sand itself or grit or dust or gossamer powder.

The powder clogged nose filters and had to be blown out. Pea sand and pea gravel rolled on a hard surface and could spill the unwary. Rock flakes cut.

And the omnipresent sand patches dragged against their feet.

Paul stopped abruptly on a rock shelf, steadied his mother as she stumbled into him.

He was pointing left and she looked along his arm to see that they stood atop a cliff with the desert stretched out like a static ocean some two hundred meters below. It lay there full of moon-silvered waves—shadows of angles that lapsed into curves and, in the distance, lifted to the misted gray blur of another escarpment.

"Open desert," she said.

"A wide place to cross," Paul said, and his voice was muffled by the filter trap across his face.

Jessica glanced left and right—nothing but sand below.

Paul stared straight ahead across the open dunes, watching the movement of shadows in the moon's passage. "About three or four kilometers across," he said.

"Worms," she said.

"Sure to be."

She focused on her weariness, the muscle ache that dulled her senses. "Shall we rest and eat?"

Paul slipped out of the pack, sat down and leaned against it. Jessica supported herself by a hand on his shoulder as she sank to the rock beside him. She felt Paul turn as she settled herself, heard him scrabbling in the pack.

"Here," he said.

His hand felt dry against hers as he pressed two energy capsules into her palm.

She swallowed her dry morsels, washed them down with a grudging spit of water from her stillsuit tube.

"Drink all your water," Paul said. "Axiom: the best place to conserve your water is in your body. It keeps your energy up. And you're stronger. Trust your stillsuit."

She obeyed, drained her catchpockets, feeling energy return. She thought then how peaceful it was here in this moment of their tiredness, and she recalled once hearing the minstrel-warrior, Gurney Halleck, say: *"Better a dry morsel and quietness therewith than an house full of sacrifice and strife."*

Jessica repeated the words to Paul.

"That was Gurney," he said.

She caught the tone of his voice, the way he spoke as of someone dead, thought: *And well poor Gurney might be dead.* The Atreides forces were either dead or captive or lost like themselves in this waterless void.

"Gurney always had the right quotation," Paul said. "I can hear him now: 'And I will make the rivers dry, and sell the land into the hand of the wicked: and I will make the land waste, and all that is therein, by the hand of strangers.' "

Jessica closed her eyes, found herself moved close to tears by the pathos in her son's voice.

Presently, Paul said: "How do you . . . feel?"

She recognized that his question was directed at her pregnancy, said: "Your sister won't be born for many months yet. I still feel . . . physically adequate."

And she thought: *How stiffly formal I speak to my own son!* Then, because it was the Bene Gesserit Way to seek within for the answer to such an oddity, she searched and found the source of her formality: *I'm afraid of my son; I fear his strangeness; I fear what he may see ahead of us, that he may tell me.*

Paul pulled his hood down over his eyes, listened to the bug hustling sounds of the night. His lungs were charged with his own silence. His nose itched. He rubbed it, removed the filter and grew conscious of the rich smell of cinnamon.

"There's melange spice nearby," he said. "The desert . . ."

A shirring of feathers exploded overhead. A screech sounded from the rocks behind them, the flapping of many wings.

"Quick!" Jessica hissed. "The distrans out of the pack."

She dug into the pack, felt the tiny cylinder and lifted it to her ear. A thin piping came to her as she adjusted the device. Riding on that carrier wave came a message: ". . . Said the Lisan al-Gaib were killed in the storm, but the hunt must . . ."

Another explosion of feathers and frantic screech sounded from the rocks. The distrans fell silent.

"The messenger," Jessica said. "A predator got it."

"Messenger?"

"Didn't you read in the manual about this thing?" she asked, holding out the distrans. "The Fremen send flying creatures with their messages. The messages are imprinted on the creature's own neural system and can be heard with this."

"I know," he said. "There was a message?"

She repeated what she had heard.

"Lisan al-Gaib," he said. "The Voice From the Outer World. Do you think the Fremen were referring to us?"

"Do you?"

"Yes. That message says they think us dead. Will they hunt for someone they believe to be dead?"

"It's just a fragment of a message," she said. "It speaks of a hunt. Who knows?" She shrugged.

"But if the Harkonnens believe us dead," he said.

"Yes . . . if."

An eider wind feathered Paul's cheeks, ruffled the folds of his burnoose. But this wind carried no threat of storm; already, he could sense the difference.

"Dawn soon," he said.

Jessica nodded.

"There's a way to get safely across that open sand," Paul said. "The Fremen do it. If they can do it, we can."

"The worms?"

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"If we were to plant one of those thumper things in the rocks here," Paul said, "it'd keep a worm occupied for a time."

She glanced at the stretch of moonlighted desert between them and the other escarpment. "Four kilometers worth of time?"

"Perhaps. And if we crossed there making only *natural* sounds, the kind that don't attract the worms . . . I saw Fremen walking on the open desert once."

He has the talent for greatness, she thought. *He cuts directly to the heart of the problem. If only he lives long enough for that talent to come fully mature.*

Paul studied the open desert beneath them, questing in his prescient memory, probing the mysterious allusions to thumpers and Maker hooks in the Fremkit manual that had come with their escape pack. He found it odd that all he sensed was pervasive terror at thought of the worms. He knew as though it lay just at the edge of his awareness that the worms were to be respected and not feared . . . if . . . if . . .

He shook his head.

"It'd have to be sounds without rhythm," Jessica said.

"What? Oh. Yes. If we broke our steps . . . the sand itself must shift down at times. Worms can't investigate every little sound. We should be fully rested before we try it, though."

He looked across at that other rock wall, seeing the passage of time in the vertical moonshadows there. "It'll be dawn within the hour."

"Where'll we spend the day?" she asked.

Paul turned left, pointed. "The cliff curves back north over there. You can see by the way it's wind-cut that's the windward face. There'll be crevasses there, deep ones."

"Had we better get started?" she asked.

He stood, helped her to her feet. "Are you rested enough for a climb down? I want to get as close as possible to the desert floor before we camp."

"Enough." She nodded for him to lead the way.

He hesitated, then lifted the pack, settled it onto his shoulders and turned along the cliff.

If only we had suspensors, Jessica thought. *It'd be such a simple matter to jump down there. But perhaps suspensors are another thing to avoid in the open desert. Maybe they attract the worms the way a shield does.*

They came to a series of shelves dropping down and, beyond them, saw a fissure with its ledge outlined by moonshadow leading along the vestibule.

Paul led the way down, moving cautiously but hurrying because it was obvious the moonlight could not last much longer. They wound down into a world of deeper and deeper shadows. Hints of rock shape climbed to the stars around them. The fissure narrowed to some ten meters' width at the brink of a dim gray sand slope that slanted downward into darkness.

"Can we go down?" Jessica whispered.

"I think so."

He tested the surface with one foot.

"We can slide down," he said. "I'll go first. Wait until you hear me stop."

"Careful," she said.

He stepped onto the slope and slid and slipped down its soft surface onto an almost level floor of packed sand. The place was deep within the rock walls.

There came the sound of sand sliding behind him. He tried to see up the slope in the darkness, was almost knocked over by the cascade. Then it trailed away to silence.

"Mother?" he said.

There was no answer.

"Mother?"

He dropped the pack, hurled himself up the slope, scrambling; digging, throwing sand like a wild man. "Mother!" he gasped. "Mother, where are you?"

Another cascade of sand swept down on him, burying him to the hips. He wrenched himself out of it.

She's been caught in the sandslide, he thought. *Buried in it. I must be calm and work this out carefully. She won't smother immediately. She'll compose herself in bindu suspension to reduce her oxygen needs. She knows I'll dig for her.*

In the Bene Gesserit Way she had taught him, Paul stilled the savage beating of his heart, set his mind as a blank slate upon which the past few moments could write themselves. Every partial shift and twist of the slide replayed itself in his memory, moving with an interior stateliness that contrasted with the fractional second of real time required for the total recall.

Presently, Paul moved slantwise up the slope, probing cautiously until he found the wall of the fissure, an outcurve of rock there. He began to dig, moving the sand with care not to dislodge another slide. A piece of fabric came under his hands. He followed it, found an arm. Gently, he traced the arm, exposed her face.

"Do you hear me?" he whispered.

No answer.

He dug faster, freed her shoulders. She was limp beneath his hands, but he detected a slow heartbeat.

Bindu suspension, he told himself.

He cleared the sand away to her waist, draped her arms over his shoulders and pulled downslope, slowly at first, then dragging her as fast as he could, feeling the sand give way above. Faster and faster he pulled her, gasping with the effort, fighting to keep his balance. He was out on the hard-packed floor of the fissure then, swinging her to his shoulder and breaking into a staggering run as the entire sandslope came down with a loud hiss that echoed and was magnified within the rock walls.

He stopped at the end of the fissure where it looked out on the desert's marching dunes some thirty meters below. Gently, he lowered her to the sand, uttered the word to bring her out of the catalepsis.

She awakened slowly, taking deeper and deeper breaths.

"I knew you'd find me," she whispered.

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He looked back up the fissure. "It might have been kinder if I hadn't."

"Paul!"

"I lost the pack," he said. "It's buried under a hundred tons of sand . . . at least."

"Everything?"

"The spare water, the stilltent—everything that counts." He touched a pocket. "I still have the paracompass." He fumbled at the waist sash. "Knife and binoculars. We can get a good look around the place where we'll die."

In that instant, the sun lifted above the horizon somewhere to the left beyond the end of the fissure. Colors blinked in the sand out on the open desert. A chorus of birds held forth their songs from hidden places among the rocks.

But Jessica had eyes only for the despair in Paul's face. She edged her voice with scorn, said: "Is this the way you were taught?"

"Don't you understand?" he asked. "Everything we need to survive in this place is under that sand."

"You found me," she said, and now her voice was soft, reasonable.

Paul squatted back on his heels.

Presently, he looked up the fissure at the new slope, studying it, marking the looseness of the sand.

"If we could immobilize a small area of that slope and the upper face of a hole dug into the sand, we might be able to put down a shaft to the pack. Water might do it, but we don't have enough water for . . ." He broke off, then: "Foam."

Jessica held herself to stillness lest she disturb the hyper-functioning of his mind.

Paul looked out at the open dunes, searching with his nostrils as well as his eyes, finding the direction and then centering his attention on a darkened patch of sand below them.

"Spice," he said. "Its essence—highly alkaline. And I have the paracompass. Its power pack is acid-base."

Jessica sat up straight against the rock.

Paul ignored her, leaped to his feet and was off down the wind-compacted surface that spilled from the end of the fissure to the desert's floor.

She watched the way he walked, breaking his stride—step . . . pause, step-step . . . slide . . . pause . . .

There was no rhythm to it that might tell a marauding worm that something not-of-the-desert moved here.

Paul reached the spice patch, shoveled a mound of it into a fold of his robe, returned to the fissure. He spilled the spice onto the sand in front of Jessica, squatted and began dismantling the paracompass, using the point of his knife. The compass face came off. He removed his sash, spread the compass parts on it, lifted out the power pack. The dial mechanism came out next, leaving an empty dished compartment in the instrument.

"You'll need some water," Jessica said.

Paul took the catchtube from his neck, sucked up a mouthful, expelled it into the dished compartment.

If this fails, that's water wasted, Jessica thought. *But it won't matter then, anyway.*

With his knife, Paul cut open the power pack, spilled its crystals into the water. They foamed slightly, subsided.

Jessica's eyes caught motion above them. She looked up to see a line of hawks along the rim of the fissure. They perched there staring down at the open water.

Great Mother! she thought. *They can sense water even at that distance!*

Paul had the cover back on the paracompass, leaving off the reset button which gave a small hole into the liquid. Taking the reworked instrument in one hand, a handful of spice in the other, Paul went back up the fissure, studying the lay of the slope. His robe billowed gently without the sash to hold it. He waded part way up the slope, kicking off sand rivulets, spurts of dust.

Presently, he stopped, pressed a pinch of the spice into the paracompass, shook the instrument case.

Green foam boiled out of the hole where the reset button had been. Paul aimed it at the slope, spread a low dike there, began kicking away the sand beneath it, immobilizing the opened face with more foam.

Jessica moved to a position below him, called out: "May I help?"

"Come up and dig," he said. "We've about ten feet to go. It's going to be a near thing." As he spoke, the foam stopped billowing from the instrument.

"Quickly," Paul said. "No telling how long this foam will hold the sand."

Jessica scrambled up beside Paul as he sifted another pinch of spice into the hole, shook the paracompass case. Again foam boiled from it.

As Paul directed the foam barrier, Jessica dug with her hands, hurling the sand down the slope. "How deep?" she panted.

"About three meters," he said. "And I can only approximate the position. We may have to widen this hole." He moved a step aside, slipping in loose sand. "Slant your digging backward. Don't go straight down."

Jessica obeyed.

Slowly, the hole went down, reaching a level even with the floor of the basin and still no sign of the pack.

Could I have miscalculated? Paul asked himself. *I'm the one panicked originally and caused this mistake. Has that warped my ability?*

He looked at the paracompass. Less than two ounces of the acid infusion remained.

Jessica straightened in the hole, rubbed a foam-stained hand across her cheek. Her eyes met Paul's.

"The upper face," Paul said. "Gently, now." He added another pinch of spice to the container, sent the foam boiling around Jessica's hands as she began cutting a vertical face in the upper slant of the hole. On the second pass, her hands encountered something hard. Slowly, she worked out a length of strap with a plastic buckle.

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"Don't move any more of it," Paul said and his voice was almost a whisper. "We're out of foam."

Jessica held the strap in one hand, looked up at him.

Paul threw the empty paracompass down onto the floor of the basin, said: "Give me your other hand. Now listen carefully. I'm going to pull you to the side and down hill. Don't let go of that strap. We won't get much more spill from the top. This slope has stabilized itself. All I'm going to aim for is to keep your head free of the sand. Once that hole's filled, we can dig you out and pull up the pack."

With one surge, Paul had her half out of the hole, holding her head up as the foam barrier gave way and sand spilled down. When it had subsided, Jessica remained buried to the waist, her left arm and shoulder still under the sand, her chin protected on a fold of Paul's robe. Her shoulder ached from the strain put on it.

"I still have the strap," she said.

Slowly, Paul worked his hand into the sand beside her, found the strap. "Together," he said. "Steady pressure. We mustn't break it."

More sand spilled down as they worked the pack up. When the strap cleared the surface, Paul stopped, freed his mother from the sand. Together then they pulled the pack downslope and out of its trap.

In a few minutes they stood on the floor of the fissure holding the pack between them.

Paul looked at his mother. Foam stained her face, her robe. Sand was caked to her where the foam had dried. She looked as though she had been a target for balls of wet green sand.

"You look a mess," he said.

"You're not so pretty yourself," she said.

They started to laugh, then sobered.

"That shouldn't have happened," Paul said. "I was careless."

She shrugged, feeling caked sand fall away from her robe.

"I'll put up the tent," he said. "Better slip off that robe and shake it out." He turned away, taking the pack.

Jessica nodded, suddenly too tired to answer.

"There're anchor holes in the rock," Paul said. "Someone's tented here before."

Why not? she thought as she brushed at her robe. This was a likely place—deep in rock walls and facing another cliff some four kilometers away—far enough above the desert to avoid worms but close enough for easy access before a crossing.

She turned, seeing that Paul had the tent up, its rib-domed hemisphere blending with the rock walls of the fissure. Paul stepped past her, lifting his binoculars. He adjusted their internal pressure with a quick twist, focused the oil lenses on the other cliff lifting golden tan in morning light across open sand.

Jessica watched as he studied the apocalyptic landscape, his eyes probing into sand rivers and canyons.

"There are growing things over there," he said.

Jessica found the spare binoculars in the pack beside the tent, moved up beside Paul.

"There," he said, holding the binoculars with one hand and pointing with the other.

"Saguaro," she said. "Scrawny stuff."

"There may be people nearby," Paul said.

"That could be the remains of a botanical testing station," she warned.

"This is pretty far south into the desert," he said. He lowered his binoculars, rubbed beneath his filter baffle, feeling how dry and chapped his lips were, sensing the dusty taste of thirst in his mouth. "This has the feeling of a Fremen place," he said.

"Are we certain the Fremen will be friendly?"

"Kynes promised their help."

But there's desperation in the people of this desert, she thought. *I felt some of it myself today. Desperate people might kill us for our water.*

She closed her eyes and, against this wasteland, conjured in her mind a scene from Caladan where they had lived so happily before this mad Arrakis venture. There had been a vacation trip on Caladan—she and the Duke Leto, before Paul's birth. They'd flown over Caladan's southern jungles above the weed-wild shouting leaves and rice paddies of the deltas. And they had seen the ant-lines in the greenery—man-gangs carrying their loads on suspensor-buoyed shoulder poles. And in the sea reaches there'd been the white petals of trimaran dhows.

All of it gone.

Now, the Duke was dead, and the waters of her life and those of her son were measured out in stillsuit catchpockets, in delicate filterpipes and two gurgling literjons.

Jessica opened her eyes to the desert stillness, to the mounting warmth of the day. Restless shadows, heat devils, were beginning to set the air aquiver out on the open sand. The other rock face across from them was like a thing seen through cheap glass.

A spill of sand spread its brief curtain across the open end of the fissure. The sand hissed down, loosed by puffs of morning breeze, by the hawks which were beginning to lift away from the clifftop. When the sandfall was gone, she still heard it hissing.

"Worm," Paul whispered.

It came from their right with an uncaring majesty that could not be ignored. A twisting burrow-mound of sand cut through the dunes within their field of vision. The mound lifted in front, dusting away like a bow wave in water. Then it was gone, coursing off to the left.

The sound diminished, died.

"I've seen space frigates that were smaller," Paul whispered.

She nodded, continuing to stare across the desert. Where the worm had passed there remained that tantalizing gap. It flowed bitterly endless before them, beckoning beneath its horizontal collapse of skyline.

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"When we've rested," Jessica said, "we should continue with your lessons."

He suppressed sudden anger, said: "Mother, don't you think we could do without . . ."

"Today, you panicked," she said. "You know your mind and bindu-nervature perhaps better than I do, but you've much yet to learn about your body's prana-musculature. The body does things of itself sometimes, and I can teach you about this. You must learn to control every muscle, every fiber of your body. You need review of the hands. We'll start with finger muscles, palm tendons and tip sensitivity." She turned away. "Come into the tent, now."

He flexed the fingers of his left hand, watching her crawl through the tent's sphincter valve, knowing that he could not deflect her from this . . . that he must agree.

Whatever's been done to me, I've been a party to it, he thought.

Review of the hand!

He looked at his hand. How inadequate it appeared when measured against such creatures as that worm.

VI

We came from Caladan—a paradise world for our form of life. There existed no need on Caladan to build a physical paradise or a paradise of the mind—we could see the actuality all around us. And the price we paid was the price men have always paid for achieving a paradise in this life—we went soft, we lost our edge.

"Muad'Dib: Conversations"
by The Princess Irulan

"So you're the great Gurney Halleck," the man said.

Halleck stood staring across the round cavern-office at the smuggler seated behind a metal desk. The man wore Fremen robes and had the half-tint blue of eyes that told of off-planet foods in his diet. The office duplicated a space frigate's master control center—communications and viewscreens along a thirty-degree arc of wall, remote arming and firing banks adjoining, and the desk formed as a wall projection—part of the remaining curve.

"I am Staban Tuek, son of Esmar Tuek," the smuggler said.

"Then you're the one I owe thanks for the help we've received," Halleck said.

"Ahhh, gratitude," the smuggler said. "Sit down."

A ship-type bucket seat emerged from the wall beside the screens and Halleck sank onto it with a sigh, feeling his weariness. He could see his own reflection now in a dark surface beside the smuggler and scowled at the lines of fatigue in his lumpy face.

Halleck turned from his reflection, stared at Tuek. He saw the family resemblance in the smuggler now—the father's heavy overhanging eyebrows and rock planes of cheeks and nose.

"Your men tell me your father is dead, killed by the Harkonnens," Halleck said.

"By the Harkonnens or by a traitor among your people," Tuek said.

Anger overcame part of Halleck's fatigue. He straightened, said: "Can you name the traitor?"

"We are not sure."

"Thufir Hawat suspected the Lady Jessica."

"Ahhh, the Bene Gesserit witch . . . perhaps. But Hawat is now a Harkonnen captive."

"I heard." Halleck took a deep breath. "It appears we've a deal more killing ahead of us."

"We will do nothing to attract attention to us," Tuek said.

Halleck stiffened. "But . . ."

"You and those of your men we've saved are welcome to sanctuary among us," Tuek said. "You speak of gratitude. Very well; work off your debt to us. We can always use good men. We'll destroy you out of hand, though, if you make the slightest open move against the Harkonnens."

"But they killed your father, man!"

"Perhaps. And if so, I'll give you my father's answer to those who act without thinking: 'A stone is heavy and the sand is weighty; but a fool's wrath is heavier than both.' "

"You mean to do nothing about it, then?" Halleck sneered.

"You did not hear me say that. I merely say I will protect our contract with the Guild. The Guild requires that we play a circumspect game. There are other ways of destroying a foe."

"Ahhhhh."

"Ah, indeed. If you've a mind to seek out the witch, have at it. But I warn you that you're probably too late . . . and we doubt she's the one you want anyway."

"Hawat made few mistakes."

"He allowed himself to fall into Harkonnen hands."

"You think *he's* the traitor?"

Tuek shrugged. "This is academic. We think the witch is dead. At least, the Harkonnens believe it."

"You seem to know a great deal about the Harkonnens."

"Hints and suggestions . . . rumors and hunches."

"We are seventy-four men," Halleck said. "If you seriously wish us to enlist with you, then you must believe our Duke is dead."

"His body has been seen."

"And the boy, too—young Master Paul?" Halleck tried to swallow, found a lump in his throat.

"According to the last word we had, he was lost with his mother in a desert storm. Likely not even their bones will ever be found."

"So the witch is dead then . . . all dead."

Tuek nodded. "And Beast Rabban, so they say, will sit once more in the seat of power here on Dune."

"The Count Rabban of Lankiveil?"

"Yes."

It took Halleck a moment to put down the upsurge of

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rage that threatened to overcome him. He spoke with panting breath: "I've a score of my own against Rabban. I owe him for the lives of my family"—he rubbed at the scar along his jaw—"and for this . . ."

"One does not risk everything to settle a score prematurely," Tuek said. He frowned, watching the play of muscles along Halleck's jaw, the sudden withdrawing in the man's shed-lidded eyes.

"I know . . . I know." Halleck took a deep breath.

"You and your men can work out your passage off Arrakis by serving with us. There are many places to . . ."

"I release my men from any bond to me; they can choose for themselves. With Rabban here—I stay."

"In your mood, I'm not sure we want you to stay."

Halleck stared at the smuggler. "You doubt my word?"

"No-o-o . . ."

"You've saved me from the Harkonnens. I gave loyalty to the Duke Leto for no greater reason. I'll stay on Arrakis—with you . . . or with the Fremen."

"Whether a thought is spoken or not it is a real thing and it has power," Tuek said. "You might find the line between life and death among the Fremen to be too sharp and quick."

Halleck closed his eyes briefly, feeling the weariness surge up in him. "Where is the Lord who led us through the land of deserts and of pits?" he murmured.

"Move slowly and the day of your revenge will come," Tuek said. "Speed is a device of Shaitan. Cool your sorrow—we've the diversions for it; three things there are which ease the heart—water, green grass and the beauty of women."

Halleck opened his eyes. "I would prefer the blood of Rabban Harkonnen flowing about my feet." He stared at Tuek. "You think that day will come?"

"I have little to do with how you'll meet tomorrow, Gurney Halleck. I can only help you meet today."

"Then I'll accept that help and stay until the day you tell me to revenge your father and all the others who . . ."

"Listen to me, *fighting man*," Tuek said. He leaned forward over his desk, his shoulders level with his ears, eyes intent. The smuggler's face was suddenly like weathered stone. "My father's water—I'll buy that back myself, with my own blade."

Halleck stared back at Tuek. In that moment, the smuggler reminded him of Duke Leto: a leader of men, courageous, secure in his own position and his own course. He was like the Duke . . . before Arrakis.

"Do you wish my blade beside you?" Halleck asked.

Tuek sat back, relaxed, studying Halleck silently.

"Do you think of me as a *fighting man*?" Halleck pressed.

"You're the only one of the Duke's lieutenants to escape," Tuek said. "Your enemy was overwhelming, yet you rolled with him . . . you defeated him the way we defeat Arrakis."

"Eh?"

"We live on sufferance down here, Gurney Halleck," Tuek said. "Arrakis is our enemy."

"One enemy at a time, is that it?"

"That's it."

"Is that the way the Fremen make out?"

"Perhaps."

"You said I might find life with the Fremen too tough. They live in the desert, in the open, is that why?"

"Who knows where the Fremen live? For us, the Central Plateau is a no-man's land. But I wish to talk more about . . ."

"I'm told that the Guild seldom routes spice lighters in over the desert," Halleck said. "But there are rumors that you can see bits of greenery here and there if you know where to look."

"Rumors!" Tuek sneered. "Do you wish to choose now between me and the Fremen? We have a measure of security, our own *sietch* carved out of the rock, our own hidden basins. We live the lives of civilized men. The Fremen are a few ragged bands that *we* use as spice hunters."

"But they can kill Harkonnens."

"And do you wish to know the result? Even now they are being hunted down like animals—with lasguns, because they have no shields. They are being exterminated. Why? Because they killed Harkonnens."

"Was it Harkonnens they killed?" Halleck asked.

"What do you mean?"

"Haven't you heard that there may've been Sardaukar with the Harkonnens?"

"More rumors."

"But a pogrom—that isn't like the Harkonnens. A pogrom is wasteful."

"I believe what I see with my own eyes," Tuek said. "Make your choice, fighting man. Me or the Fremen. I will promise you sanctuary and a chance to draw the blood we both want. Be sure of that. The Fremen will offer you only the life of the hunted."

Halleck hesitated, sensing wisdom and sympathy in Tuek's words, yet troubled for no reason he could explain.

"Trust your own abilities," Tuek said. "Whose decisions brought your force through the battle? Yours. Decide."

"It must be," Halleck said. "The Duke and his son are dead?"

"The Harkonnens believe it. Where such things are concerned, I incline to trust the Harkonnens." A grim smile touched Tuek's mouth. "But it's about the only trust I give them."

"Then it must be," Halleck repeated. He held out his right hand, palm up and thumb folded flat against it in the traditional gesture. "I give you my sword."

"Accepted."

"Do you wish me to persuade my men?"

"You'd let them make their own decision?"

"They've followed me this far, but most are Caladan-

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born. Arrakis isn't what they thought it'd be. Here, they've lost everything except their lives. I'd prefer they decided for themselves now."

"Now is no time for you to falter," Tuek said. "They've followed you this far."

"You need them, is that it?"

"We can always use experienced fighting men . . . in these times more than ever."

"I may make my own decision in this, then?"

"Your own decision."

Halleck pushed himself up from the bucket seat, feeling how much of his reserve strength even that small effort required. "For now, I'll see to their quarters and well being," he said.

"Consult my quartermaster," Tuek said. "Drisq is his name. Tell him it's my wish that you receive every courtesy. I'll join you myself presently. I've some off-shipments of spice to see to first."

"Fortune passes everywhere," Halleck said.

"Everywhere," Tuek said. "A time of upset is a rare opportunity for our business."

Halleck nodded, heard the faint susurration and felt the air/shift as a lockport swung open beside him. He turned, ducked through it and out of the office.

He found himself in the assembly hall through which he and his men had been led by Tuek's aides. It was a long, fairly narrow area chewed out of the native rock, its smooth surface betraying the use of cutteray burners for the job. The ceiling stretched away high enough to continue the natural supporting curve of the rock and to permit internal air-convection currents. Weapons racks and lockers lined the walls.

Halleck noted with a touch of pride that those of his men still able to stand were standing—no relaxation in weariness and defeat for them. Smuggler medics were moving among them tending the wounded. Litter cases were assembled in one area down to the left, each wounded man with an Atreides companion.

The Atreides training—"*We care for our own!*"—it held like a core of native rock in them, Halleck noted.

One of his lieutenants stepped forward carrying Halleck's nine-string baliset out of its case. The man snapped a salute, said: "Sir, the medics here say there's no hope for Mattai. They have no bone and organ banks here—only outpost medicine. Mattai can't last, they say, and he has a request of you."

"What is it?"

The lieutenant thrust the baliset forward. "Mattai wants a song to ease his going, sir. He says you'll know the one . . . he's asked it of you often enough." The lieutenant swallowed. "It's the one called '*My Woman*,' sir. If you . . ."

"I know." Halleck took the baliset, flicked the multi-pick out of its catch on the fingerboard. He drew a soft chord from the instrument, found that someone already had tuned it. There was a burning in his eyes, but he drove that out of his thoughts as he strolled forward, strumming the tune, forcing himself to smile casually.

Several of his men and a smuggler medic were bent over one of the litters. One of the men began singing softly as Halleck approached, catching the counter-beat with the ease of long familiarity:

My woman stands at her window,
Curved lines 'gainst square glass.
Uprais'd arms . . . bent . . . downfolded
'Gainst sunset pure and golded—
Come to me . . .
Come to me, warm arms of my lass.
For me . . .
For me, the warm arms of my lass.

The singer stopped, reached out a bandaged arm and closed the eyelids of the man on the litter.

Halleck drew a final soft chord from the baliset, thinking: *Now, we are seventy-three.*

VII

Before the coming of Muad'Dib, the Fremen of Arrakis practised a religion whose roots in the Maometh Saari are there for any scholar to see. Many have traced the extensive borrowings from other religions. The usual example is the hymn to water, a direct copy from the Orange Catholic Liturgical Manual, calling for rain clouds which Arrakis had never seen. But there are more profound points of accord between the Kitab al-Ibar and the teachings of Bible, Ilm and Fiqh.

"Arrakis Awakening"
by The Princess Irulan

Paul stood outside the stilltent in the late afternoon. The crevasse where he had pitched their camp lay in deep shadow. He stared out across the open sand at the distant cliff, wondering if he should waken his mother, who lay asleep in the tent.

Folds upon folds of dunes spread beyond their shelter. Away from the setting sun, the dunes exposed greased shadows so black they were like bits of night.

And the flatness.

His mind searched for something tall in that landscape. But there was no persuading tallness out of heat-addled air and that horizon—no bloom nor gently shaken thing to mark the passage of a breeze . . . only dunes and that distant cliff beneath a sky of burnished silver-blue.

What if there isn't one of the abandoned testing stations across there, he wondered. *What if there are no Fremen, either, and the plants we see are only an accident?*

Within the tent, Jessica awakened, turned onto her back and peered sidelong out the transparent end at Paul. He stood with his back to her and something about his stance reminded her of his father. She sensed the well of grief rising within her and turned her head away.

Presently, she adjusted her stillsuit, refreshed herself with water from the tent's catchpocket, and slipped out to stand and stretch the sleep from her muscles.

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Paul spoke without turning: "I find myself enjoying the quiet here."

How the mind gears itself for its environment, she thought. And she recalled a Bene Gesserit axiom: *"The mind can go either direction under stress—toward positive or toward negative: on or off. Think of it as a spectrum with unconsciousness at the negative extreme and hyperconsciousness at the positive extreme. The way the mind leans under stress is influenced by training."*

"It could be a good life here," Paul said.

She tried to see the desert through his eyes, seeking to encompass all the rigors this planet accepted as commonplace, wondering at the possible futures Paul had glimpsed. *One could be alone out here,* she thought, *without fear of someone behind you, without fear of the hunter.*

She stepped past Paul, lifted her binoculars, adjusted the oil lenses and studied the escarpment across from them. Yes, saguaro in the arroyos and other spiny growth . . . and a matting of low grasses, yellow-green in the shadows.

"I'll strike camp," Paul said.

Jessica nodded, walked to the fissure's mouth where she could get a sweep of the desert, and swung her binoculars to the left. A salt pan glared white there with a blending of dirty tan at its edges—a field of white out here where white was death. But the pan said another thing: *water.* At some time water had flowed across that glaring white. She lowered her binoculars, adjusted her burnoose, listened for a moment to the sound of Paul's movements.

The sun dipped lower. Shadows stretched across the salt pan. Lines of wild color spread over the sunset horizon. Color streamed into a toe of darkness testing the sand. Coal-colored shadows spread, and the thick collapse of night blotted the desert.

Stars!

She stared up at them, sensing Paul's movements as he came up beside her. The desert night focused upward with a feeling of lift toward the stars. The weight of the day receded.

"The first moon will be up soon," Paul said. "The pack's ready. I've planted the thumper."

We could be lost forever in this hellplace, she thought. *And no one to know.*

The night wind spread sand runnels that grated across her face, bringing the smell of cinnamon.

"Smell that," Paul said.

"I can smell it even through the filter," she said. "Riches. But will it buy water?" She pointed across the basin. "There are no artificial lights across there."

"Fremen would be hidden in a sietch behind those rocks," he said.

A sill of silver pushed above the horizon to their right: the first moon. It lifted into view, the hand pattern plain on its face. Jessica studied the white-silver of sand exposed in the light.

"I planted the thumper in the deepest part of the crevasse," Paul said. "Whenever I light its timer-candle it'll give us about thirty minutes."

"Thirty minutes?"

"Before it starts calling . . . a . . . worm."

"Oh. I'm ready to go."

He slipped away from her side and she heard his progress back up their fissure.

The night is a tunnel, she thought, *a hole into tomorrow* . . . She shook her head. *Why must I be so morbid? I was trained better than that!*

Paul returned, took up the pack, led the way down to the first spreading dune where he stopped and listened as his mother came up behind him. He heard her soft progress and the cold single-grain dribbles of sound—the desert's own code spelling out its measure of safety.

"We must walk without rhythm," Paul said and he called up a memory glimpse of two men he had seen one day walking the sand . . . a long ago day, it seemed, before his father had been killed. He drove that thought out of his mind, focused only on what he remembered of the way the two men had walked.

"Watch how I do it," he said. "I've seen the way Fremen walk the sand."

He stepped out onto the windward face of the dune, following the curve of it, moving with a dragging step.

Jessica studied his progress for ten steps, followed, imitating him. She saw the sense of it: they must sound like the natural shifting of sand . . . like the wind. But muscles protested this unnatural broken pattern: Step . . . drag . . . drag . . . step . . . step . . . wait . . . drag . . . step . . .

Time stretched out around them. The rock face ahead seemed to grow no nearer. The one behind still towered high.

"Lump! Lump! Lump! Lump!"

It was a drumming from the cliff behind.

"The thumper," Paul hissed.

Its pounding continued and they found difficulty avoiding the rhythm of it in their stride.

"Lump . . . lump . . . lump . . . lump . . ."

They moved in a moonlit bowl punctured by that hollow thumping. Down and up through spilling dunes: step . . . drag . . . wait . . . step . . . Across pea sand that rolled under their feet: drag . . . wait . . . step . . .

And all the while their ears searched for a special hissing.

The sound, when it came, started so low that their own dragging passage masked it. But it grew . . . louder and louder . . . out of the west.

"Lump . . . lump . . . lump . . . lump . . ." drummed the thumper.

The hissing approach spread across the night behind them. They turned their heads as they walked, saw the mound of the coursing worm.

To be continued

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a nice day for screaming

Sometimes, in deep space, it may
be hard to tell the cargo from the owners of a ship . . .

JAMES H. SCHMITZ

Illustrated by Kelly Freas

As soon as the Marsar Shift began, Adacee newscaster Keth Deboll had the feeling that he wasn't going to like this assignment. In part, it might be simply a reaction to the pitch-blackness which closed down instantly on the pseudospace ship. He knew the lights in the personnel section around him were on. Yet not the faintest glow was visible anywhere—not even from Furnay's control console directly before him. It was the deadest, emptiest black he had ever experienced . . . the kind of black that might be left after the Universe ended. The thought came suddenly that, if he had to stay in it for any length of time, it would drain everything out of him and leave him sitting here, an empty, black shell, as dead as the rest of it.

However, the shift wouldn't last long. The Navy men with whom Keth Deboll had talked during his briefing the day before had emphasized the eerie aspects of Space Three, no doubt deliberately. Keth knew he wasn't welcome on board, and he couldn't have cared less. It had taken a great deal of maneuvering and string-pulling by the Adacee News Viewer System to get him the assignment on one of the fourteen pseudospace ships presently in operation. The Navy wanted more money for its enormously expensive Space Three projects; and in the end the argument had prevailed that the best way to get popular support for their wishes was to have a popular newscaster provide an enthusiastic, first-hand projected report on one of the sorties into pseudospace. And there were simply no more popular newscasters in the Federation that year than Keth Deboll.

But the men he would actually be on shipboard with hadn't liked the arrangement much, especially the provision that Keth was to have the run of the ship insofar as he didn't interfere with operations. And like many other people who dealt with him in person, they might not have cared much for Keth. He was undersized and thin, still on the young side but already—since he lived well—sporting a small, round paunch. A point which seemed to irk the Navy scientists in particular was that he hadn't bothered to take notes on the information they had given him for the telecast. Keth never did take notes, of course; he had nearly perfect recall. But they didn't know that.

There was a brief, sharp tingling in the palm of his right hand—a signal from Furnay, his technician, that the telecast, which would be transmitted to normspace by special Navy communicators, was beginning; and Keth automatically began to talk . . .

As usual, he didn't pay much attention to what he was saying. It wasn't necessary. The relevant material was stored in his mind, already arranged into a number of variant patterns. Depending on the circumstances, it would emerge in one sequence or another, always coherently, smoothly, effectively. He discovered he had started now with the statement that this was another milestone in newscasting history—the first direct report from pseudospace or Space Three. They were shifting at the moment into the field of an entirely new class of energies, a region where space appeared to exist only as a useful symbol, or as an illusionary medium in the recording instruments. The discovery of pseudospace five years ago had been a triumph of human ingenuity; its existence had been established by the calculations of Navy mathematicians, and the means of contacting it derived from those same calculations. Since then two new mathematical systems already had been developed to provide even a theoretical understanding of the problems encountered in the further exploration of this weird new stratum of the Universe.

He turned briefly to technicalities. They would remain in pseudospace for the period of one hour less a few minutes, in a Navy ship especially designed and constructed to permit even temporary existence there. Aside from the standard drives, it was equipped with an engine which made the shift possible. This engine would be shut off as soon as the shift was accomplished, would be turned on again ten minutes before the scheduled return because it took five minutes to build up the required power for the

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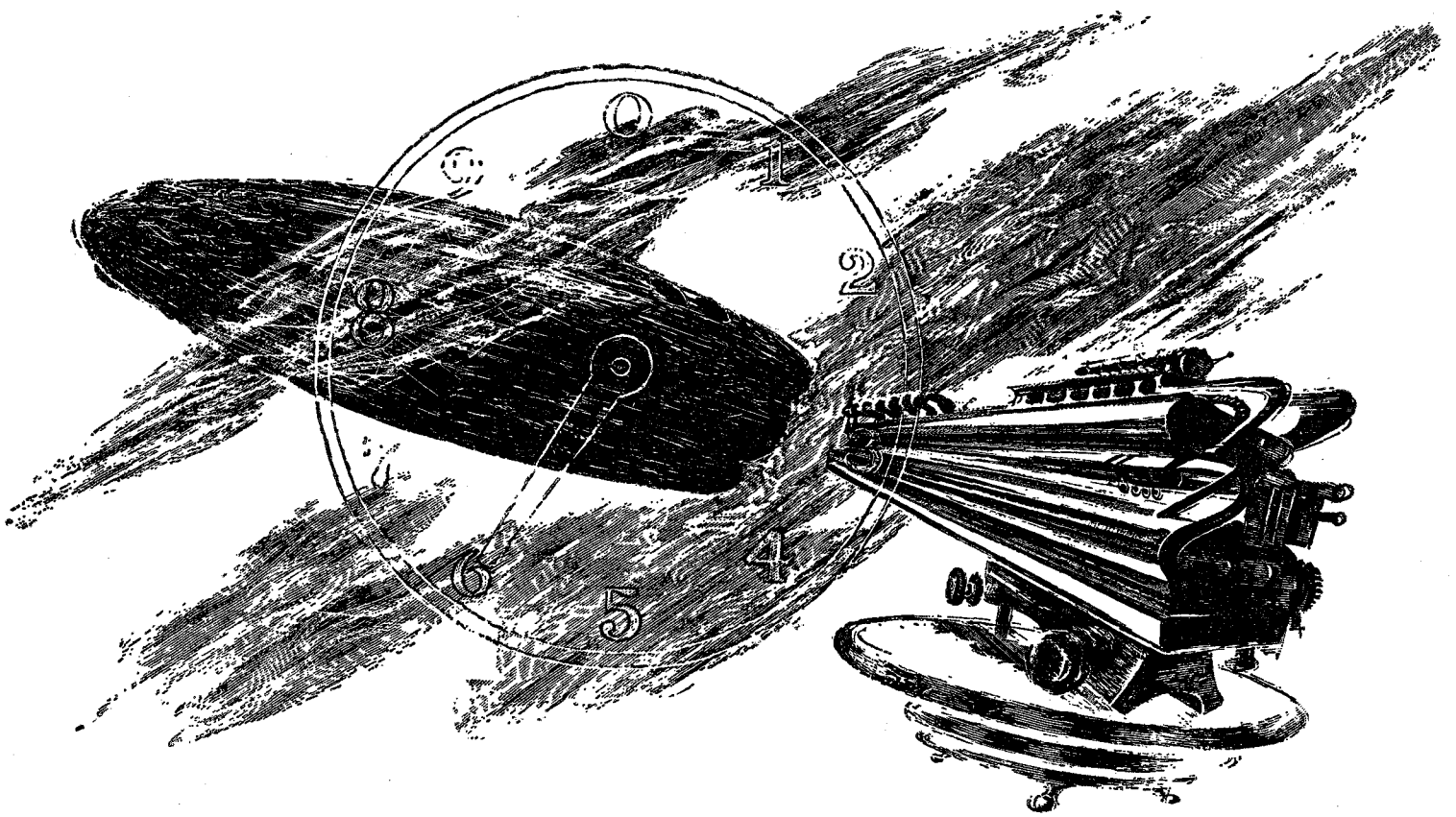
shift. One hour was at present the maximum period a ship could remain safely in Space Three.

The shift engine would be shut off for the curious reason that although motion *in* Space Three was impossible, motion relative to normal space and subspace *while* in Space Three was not only possible but greatly augmented. What produced it was any use of energy by the intruding vessel. The result was that a pseudospace ship always emerged into normspace again at a point removed from its point of entry—and at a distance far greater than it could otherwise have covered by the full use of standard drive engines in the same period of time. The potential value of this phenomenon for space travel was obvious; but at present there was no fixed ratio between the energy expended by a ship and the distance it moved, and the direction in which it would move was equally unpredictable. Many of the multiple studies programed for today's one-hour shift were designed to yield additional information on precisely those points.

Their shift had been initiated in the vicinity of Orado. They would release an exceptional amount of energy because of a demonstration graciously prepared by the Navy to illustrate certain interesting qualities of pseudospace to Adacee's billions of viewers. So all they knew definitely was that when they emerged again, they would find themselves somewhere within the space boundaries of the Federation. The exact location would be determined after they had arrived.

Keth Deboll came to that point at the instant the Marsar Shift ended and the ship lights reappeared. He hadn't consciously planned it that way; but he'd been told how long the shift would take, and the material stored in his mind had re-sorted itself so that he'd have the preliminary explanations cleared up when the moment came.

He went on without a break into the next part. In a moment the vision screens would go on. He and Furnay had been provided with a smaller duplicate of the main screen at the far end of the personnel section; and Adacee's viewers would get the first live look afforded the general public of the instruments' rendition of a nonspatial energy field. They would be seeing something no eyes had seen, or could have seen, before Man's supreme intelligence, determination and courage found a way to begin to map Space Three—perhaps eventually to make use of it.



The illusionary medium of Space Three appeared abruptly. Keth's stomach seemed to turn over twice. He had the feeling that he was being pulled painlessly but inexorably apart. His mouth went on talking but he hadn't the faintest idea now of what he said. The medium was a bright pink and white, gave the impression of vast but unstable depth. The colors shifted in slowly changing patterns. Something like a transparent vapor streamed by from right to left—Keth had the impression it was a considerable distance away—like clouds moving across a summer sky. Of course, "distance" had no actual meaning here.

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And neither, his voice reminded the viewers, did the word "cold" retain its familiar meaning in Space Three. It was cold beyond any previous understanding of the term, not merely in the sense of an utter absence of heat, but cold on the ascending scale, so to speak—cold above cold above cold.

This was the great hazard of Space Three, the factor which would have made it impenetrable, if its existence had been known, to life before Man. For the reason Man could penetrate it was the great discovery of the Marsar Field . . .

This whole universe-of-the-moment, Keth decided, was being twisted slowly in two directions at once! Not only Space Three in the screen, but the pseudospace ship itself, and he and Furnay in the seat beside him. He couldn't actually see anything to tell him why he knew that, but he knew it, and it was an extraordinarily unpleasant thing to know. He heard Furnay swallowing noisily—no harm done, the filters would catch it—and began to wish he had eaten a less healthy breakfast an hour ago . . .

The Marsar Energy Field, his voice was continuing smoothly, coated the outer boxlike hull of the pseudospace ship. The personnel section in the center of the ship, where they now were, was another box, separated from the other compartments of the ship by gravity pressors. In other words, the personnel section was suspended, floating free within the ship; and it also was coated with the Field.

This was a very necessary precaution because the Marsar Field was the only thing which stood now between them and the ultimate cold of Space Three—and it would be demonstrated immediately what that ultracold did to objects from normal space which lacked the Field's protection . . .

Keth had come to his feet, still speaking, and was moving along an open aisle toward an adjoining part of the personnel section. He wasn't concerned about getting beyond the range of the instruments; it was Furnay's department to cover him wherever he was in the ship, and Furnay would do it. He stopped at another screen where two Navy technicians were sitting. The expectancy in their faces as he approached had told him they were hoping for signs that Space Three was churning the unwelcome guest's brain along with assorted other innards; so he flashed them the famous Keth Deboll grin without interrupting his easy flow of talk. They swung back disappointedly to their switches and buttons.

"And these are the two gentlemen selected to carry out the demonstration . . ." Keth gave their full names, which shook them a little, went on explaining each move they made as they made it, never at a loss, never hesitant, enjoying his control of the situation and of the continuing awful feeling of internal and external distortion . . .

The pseudospace ship had brought another vessel into Space Three with it—a chunky, old-fashioned siege boat, of no greater length than a destroyer but covered with armor of the densest, toughest workable material known, designed to move in against the fire of heavy planet-based guns and remain operational. Unmanned because it was to be sacrificed now for the benefit of Adacee's viewers, it hung in the screen, gradually increasing in size. The two ships were in motion relative both to normal space and to each other, Keth explained—the siege boat only because its Marsar Field and the shift engine with which it had been equipped were giving off energy while the pseudospace ship was additionally using its standard drives to maneuver closer to the intended victim . . . but not too close because any contact with another solid object would collapse its Marsar Field—

Two devices had appeared in the screen about midway between the two ships, and Keth's description slid over to them, quickening. Telecontrolled projectile guns, each balancing a detached four-inch steel sphere in its launching field, spheres and guns both shielded by the Marsar effect, of course . . . and now one had veered about, his voice announced, rising in exicitement, had aimed at the doomed siege boat, and the sphere was launched.

Close-up of a steel ball seemingly motionless against the frozen pink and white of pseudospace, then the armored flank of the siege boat swinging into view, swinging in toward it. The four-inch missile struck and adhered.

The close-up flowed out, became the previous picture, now including the projected image of a huge transparent time dial, a second hand sweeping around through its ten marked sections. As the hand touched the tenth mark, the dial vanished, the other projectile gun swerved, and the second steel ball was launched. Keth abruptly stopped speaking.

This time, there was no close-up. A moment passed; and then the siege boat shattered.

It was not a violent process but an awesomely quiet one. Cracks flicked about the massively armored hull, joined and deepened. The boat began to drift apart in sections, each section splitting again and again as it came separate. For an instant, the shift engine showed, protected by its own Marsar and pressor fields from the debacle around it, then vanished, on its way back to normspace. Keth felt a stab of annoyance. The Navy had insisted on salvaging the engine, and its intact appearance meant a fractional loss in overall effect.

But otherwise the picture of absolute destruction was complete. Chunks of battle-armor capable of resisting the pounding of ultrabeams continued to crack into fragments, fragments splintered into dust, Keth's voice quietly accompanying the siege boat's destruction. For a moment, a glittering fog, which still retained a suggestion of the vessel's outlines, was visible; then Space Three was clear again. Probably not one in a million of Adacee's viewers had noticed the simultaneous dissolution of the projectile guns, triggered off from the pseudospace ship.

And this was the explanation for the dual protection given the personnel section, Keth continued. If, for any

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reason, their ship's outer Marsar Field should fail . . . and Marsar Fields had been known to fail for reasons never explained . . . the rest of the ship would, within seconds, become a homogenous, brittle-frozen mass. But the personnel section would remain intact within its own field, and since it contained the shift engine, it could be brought back by itself to normal space to await the arrival of rescue ships.

In spite of such precautions, one pseudospace ship not too long ago had simply stopped communicating and disappeared during a shift. Space Three remained a medium of both unfathomed opportunities and unfathomed dangers, and until . . .

Keth again stopped listening to what he was saying. It was familiar ground: a pitch for money. The Navy was getting what it had paid for by providing the stage for a Deboll newscast while Keth moved toward the instrument room at the far end of the section. There he would introduce several scientists, question them individually about their specialties, then switch back to a few minor demonstrations . . . and, blessedly, the gruesome hour would be over.

A sharp whisper suddenly beside his left ear. "Keth! Get back here!"

What did Furnay want? Keth turned, started back toward the technician, not too hurriedly, mind racing. His commentary veered off from the interviews toward which it had been leading, took a new tack which would provide an opening for whatever had caught Furnay's attention. Whatever had caused that interruption could be no minor matter.

As he slid into his seat before the screen, Furnay's filtered voice said hurriedly on his left, "That dot in the upper right corner! It appeared just a moment ago and it's getting larger fast—"

Keth's eyes flicked over the screen, found the dot. More than a dot . . . an irregular little dark blotch against the blazing white of Space Three, changing shape constantly and expanding visibly as he stared at it. For an instant, he felt cold fury. They hadn't mentioned anything like this in yesterday's briefing, and in seconds he'd have to be talking about it, explaining it glibly! His hand already had pressed a button on the little intercom rod in his pocket which would connect him with one of the observers at the big screen, the man who was standing by to fill in if Keth felt unable to interpret what the screens showed.

He hadn't expected to use that button . . . and now the fool didn't respond! He pressed again, repeatedly, ragingly.

A loud voice announced:

"Emergency stations! Repeat—emergency stations! Unidentified object approaching . . ."

Keth drew a sharp breath. *They* didn't know what it was! A new Space Three phenomenon in the middle of the newscast—what a break! WHAT a break! He swung into the situation instantly, opening the pickup filters, which had been blurring out irrelevant sounds, and every intercom, catching commands and responses crossing the personnel section his voice running along with them, expanding, improvising . . . The drive engines came on with a muted roar; the pseudospace ship moved away, out of the course of the unknown object which had been headed directly towards them—and which, thirty seconds later, *again* was headed directly towards them. The ship suddenly picked up speed in dead earnest.

They had turned on the shift engine, Keth announced to Adacee's viewers, voice shaking with excitement; but of course, it would take five minutes for the engine to develop enough power to permit their return to normal space. Meanwhile the blob, the blotch—the unidentified object—now four or five inches across in the screen—was sliding sideways out of sight as the ship turned away from it. It was still vague . . . objects more than two miles apart in normspace terms could not be clearly defined in pseudospace; but there was a suggestion, more than a suggestion, of bunched tentacles trailing from that shifting shape. It definitely, almost definitely, was following them—

Furnay was stabbing buttons desperately, as the object vanished from the screen, to get them switched over to another one where it would be visible again. The Adacee feedback tinkle sounded in Keth's left ear; a jubilant voice whispered, "Terrific, Deboll! Terrific! None of us can imagine how you did it, but keep the thing running! The interest indicator jumped to absolute top in less than thirty seconds and is staying right there. You sound scared to death!"

He was scared to death, Keth discovered. His knees rattled together whenever they came within four inches of each other . . . And now the screen blinked twice and shifted to a slightly different view of pseudospace.

"AWK!" Furnay said hoarsely.

The pursuing object couldn't be much more than two miles behind them now because its details were trembling on the verge of becoming discernible. Only two *miles*, Keth repeated, stunned, to himself—with the ship roaring along on its space drive!

And with that, the personnel section went black.

Keth heard a thump beside him, put out his hand and found Furnay collapsed forward on the control console. He wasn't sure whether the technician had fainted or not, and he started shaking him by the shoulder. The intercom was still full of voices and his own voice was continuing automatically. "We have begun the Marsar Shift! Apparently, we escaped with only seconds to spare! What this . . ."

"Mr. Deboll," the intercom told him sharply, "the newscast was cut off twenty seconds ago! Communications is pre-empting all channels until we have completed the shift to normspace and established our new location there."

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Twenty seconds ago would have been the instant they entered the shift! Oh, not bad, Keth thought giddily. Not bad at all! The last impression Adacee's viewers had been given was of that horrific unknown pursuer closing in. And now minutes of silence before the ship's escape was confirmed—it would be the sensation of the month!

"Shift ending," the intercom said. "Remain at your stations . . ."

The lights came on. The screen before Keth remained black for an instant. Then something flickered in it, and he was looking out at clouds and rivers of blazing stars.

Somebody cheered. After that, there was a dead stillness for perhaps half a second . . .

Somebody else yelled hoarsely. Keth shot up half out of his seat, stayed crouched, bent forward, staring at the screen.

The stars on the right were being obscured by a darkness which came flowing out over them . . . a darkness which extended broad, whipping tendrils and grew, covering half the screen, two thirds of it. Voices were shouting, and at the last moment, before the screen was completely blanked out, Keth glimpsed something like a section of a huge, rubbery tube swinging down toward him through space.

The personnel section seemed to slue around. The deck came up under Keth, threw him stumbling half across Furnay. He grasped the technician's shoulders to right himself.

"*Main drive dead!*" the intercom bellowed incredulously.

There was the sluing motion again, this time in reversed direction. For a moment, stars reappeared in one corner of the screen, racing through it—as if, Keth thought, the ship were spinning wildly through space. The deck heaved. He staggered, pitched forward, then back, tripped and went down. Something hard slammed the side of his head, and his mind went blank.

"He's coming around now," Furnay's voice was saying. "Hey, Keth, wake up!"

Keth opened his eyes. He was lying in the seat before the screen, tilted backward. Furnay was on one side of him, somebody else stood on the other side. He jerked his head up to look at the screen. It was full of stars.

"What's happened?" he gasped.

"We're no longer in danger, Mr. Deboll," the other man said reassuringly. He was in his shirt sleeves and closing a flat container full of medical instruments. "Exactly what did happen isn't at all clear, but we should know shortly."

"Captain Roan," the intercom said, "please come to Station Three at once!"

The man smiled at Keth, said to Furnay "He'll be all right now," and hurried off with his container.

"That's the doctor," Furnay said. "You cut your head pretty bad, but he sealed it." Furnay looked pale and shaken. "That thing, whatever it was, went back to Space Three. Or at least, it's gone. I came to in the middle of it all, while it was coming aboard . . ."

"Coming aboard?" Keth repeated blankly. "You were hallucinating, Furnay. That thing was a hundred times bigger than this ship! I saw part of it close up."

"Well, something came on board," Furnay said doggedly. "Ask anybody. First there was an awful banging over the intercom from somewhere else on the ship. Then somebody yelled that all three ship locks were being opened."

"From outside?"

Furnay looked at him. "Keth, nobody here was opening them, believe me! Then there was more banging here and there for a while. They were trying to find out what was going on out there, of course, but the intership screens were too blurred to make out anything. That went on for a while." Furnay wet his lips. "Then the lock to the personnel section began to open . . ."

"*Huh?*"

"That's right," Furnay said. "It came right in here."

"*What* came right in here?" Keth demanded savagely.

The technician spread his hands. "Nobody really got a look at it, Keth! The air sort of got thick—not to breathe; it was more like you were trying to look through syrup. Same thing that had been blurring the intership screens apparently. It only lasted about a minute. Then the air turned clear and the lock here closed. Maybe a minute later, the ship screens cleared, and the three big locks all closed together. Nobody had seen anything. Right after that, everything went black again."

"Marsar Shift black, you mean?"

Furnay nodded. "We were shifting to Space Three. That seems to be why it came in here—to start the shift engine. But somebody reversed the field right away and we came back to normspace. The thing was gone, and the main problem now seems to be that our space drive is almost out. We're barely able to move. But the transmitters started working again . . ."

"They were out?" Keth asked.

"They went blank about the time the drive engines stopped" Furnay said. "Then, as soon as the thing left, they started up again. The communication boys called for help, and there's a Space Scout squadron four days away headed toward us now . . ."

"Four *days* away?"

"Well, we're way outside of the Hub. That five-minute run on full drive, while the shift engine was warming up, brought on the biggest Space Three jump ever recorded . . . Where are you going?"

Keth was climbing to his feet. "Where do you think? We still have a newscast running. I'm going to get hold of the brass, find out exactly what they know, and get Communication to release a channel so we can start beaming it back. This is the biggest . . ."

"Wait a minute, Keth!" Furnay looked worried. "This is a Navy ship and we're operating under emergency regulations at the moment." He nodded at the open per-

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sonnel section lock fifty feet away. "The brass is outside in the ship, checking things over. Everyone else has been ordered to remain at their stations. And they figure this is our station."

Keth grunted irritably, looked around. A gold-braided jacket and cap lay across a chair a few feet away. He went over, glanced around again, put them on.

"They're the doctor's," Furnay said.

"He won't miss them. Sit tight here."

Keth walked down the aisle toward a food dispenser fifteen feet from the open lock. The borrowed jacket and cap were decidedly too big for him, and from moment to moment he was in partial view of various groups in the section; but everyone was too involved in discussing recent events to pay him much attention. He paused at the dispenser, punched a button at random and received a tube of liquid vitamins. Half turning, he flicked a glance from under the cap brim about the part of the section he could see, moved on to the lock and stepped quietly through it.

There was no one in sight on the other side. He turned to the right along the passage through which he and Furnay had been conducted to the personnel section a little over an hour ago. The main entrance lock was just beyond its far end, out of sight. He might find something there to tell him how to get to the engine room. Since they were having trouble with the drives, that was presumably where the investigating senior officers would be.

At the end of the passage, he stopped, startled. The lock room was almost entirely filled with an assortment of items he found himself unable to identify. One wall was lined to the ceiling with luminous hexagonal boxes arranged like a honeycomb. Against them leaned bundled extrusions which looked like steel with bubbles of light trickling slowly through it. Completely blocking the lock was a great mass of rainbow-colored globes two feet in diameter, which appeared to be stuck together. The weirdest item was stacked by the hundreds along the left wall . . . transparent plastic blocks, each containing something which looked partly like a long-haired gloomy monkey and partly like a caterpillar.

Keth blinked at the arrangement, mouth open, for a moment, went over and touched a finger gingerly against one of the globes. It felt warm—around a hundred and ten degrees, he decided. Scowling and muttering to himself, he went off down another passage.

He passed a closed door, hesitated, returned and opened it. The area beyond was filled about equally by transparent sacks, bulging with what looked like white diamonds, and large, dark-red cylinders. The cylinders were groaning softly. Keth closed the door, opened another one thirty feet farther on, glanced in and hurriedly slammed it shut. He walked on, shaking his head, his mouth working nervously.

A minute or two later, he saw a sign which said ENGINE ROOM—MAINTENANCE above an opened lock. Keth entered, found himself on the upper level of the engine room with a spider web of catwalks running here and there about the machinery. From below came the sound of voices.

He edged out on one of the catwalks, peered down. Half a dozen men, two of them in uniform, stood about an open hatch from which another uniformed man, the engineering officer, was just emerging. These were the ship's senior officers, and every one of them, Keth reminded himself, was also one of the Federation Navy's top scientists. They were too far off to let him understand what they were talking about, but if he got within hearing range without being discovered, he should gather information they wouldn't volunteer for the purposes of a newscast. He drew back out of sight, located a ladder along the wall and climbed down to the main level.

Guided by their voices, he threaded his way among the machines toward the group. There was a sudden, loud slam—the hatch being closed again. Then the voices were coming toward him on the other side of the massive steel bole along which he had been moving. Keth flattened himself quickly into a shallow niche of the machine, stayed still.

They came out into an intersection of passages on Keth's left and stopped there. He held his breath. If they looked over at him now, they couldn't miss seeing him. But the engineering officer was speaking and their attention was on him.

"Up to a point," he was saying, "the matter is now clear! It removed our fuel plates and replaced them with its own . . ."

Keth's ears seemed to flick forwards. What was that? His thoughts began to race.

"Those plates," the man went on, "are producing energy. In fact, they have a really monstrous output. But the energy doesn't do much for our drives. In some way, almost all of it is being diverted, dissipated, shunted off somewhere else.

"There's no immediate explanation for that, but it isn't a practical problem. We'll simply shut off the drives, pull out the plates and put our own back again. We'll be docking at the station in a week. If we had to use this stuff, it would take us half a dozen years to crawl back to the Hub under our own power."

"In normspace," another man said.

"Yes, in normspace. In pseudo, naturally, it would be a very different matter."

The ship captain scratched his chin, remarked, "In pseudo, if your figures on the output are correct, those plates might have carried us out of the galaxy in a matter of hours."

"Depending on the course we took," the engineering officer agreed.

There was a pause. Then somebody said, "When we were maneuvering to get the siege boat in range, we may have been moving along, or nearly along, one of the sched-

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uled courses. That and our slow speed would have been the signal . . ."

"It seems to explain it," the engineering officer said. He added, "A point I still don't understand is why we didn't lose our atmosphere in the process! We're agreed that the fact we were aboard would have had no meaning for the thing—it was a detail it simply wouldn't register. Yet there has been no drop in pressure."

Another man said dryly, "But it isn't quite the same atmosphere! I've found a substantially higher oxygen reading. I think it will be discovered that some of the objects it left on board—I suspect those in the lock room in particular—contain life in one form or another, and that it's oxygen-breathing life."

"That may have been a very fortunate circumstance for us," the captain said. "And . . ." His eyes had shifted along the passage, stopped now on Keth. He paused. "Well," he said mildly, "it seems we have company! It's the gentleman from the newscast system."

The others looked around in surprise.

"Mr. Deboll," the captain went on thoughtfully, "I take it you overheard our discussion just now."

Keth cleared his throat. "Yes," he said. He took off the medical officer's cap.

"You came down here by way of the main lock passage?"

"Yes."

There was silence for a moment. Then the engineering officer said, "As I see it, no harm has been done!" He looked rather pleased.

"Quite the contrary, in my opinion!" said the captain. He smiled at Keth. "Mr. Deboll please join our group! In observing you during yesterday's briefing, I was struck by your quickness in grasping the essentials of a situation. No doubt, you already have realized what the explanation for this extraordinary series of events must be."

"Yes, I have," Keth said hoarsely.

"Excellent. Our instructions are that we must not interfere in any way with your report to the public. Now I have a feeling that what you will have to say may be a definite upset to those who have maintained the exploratory Space Three projects should be limited or abandoned because of their expense, and because no information of practical value could possibly be gained from them."

"My guess is you'll get anything you want for them now," Keth told him.

The captain grinned. "Then let's return to the personnel section and get that newscast going!"

They started back to the engine room entrance Keth mentally phrasing the manner in which he would explain to Adacee's waiting billions of viewers that the pseudo-space ship—one of Man's great achievements—had been halted, engulfed, checked, fueled, loaded up and released by somebody else's automatic depot and service station for intergalactic robot cargo carriers. ■

the analytical laboratory

Since we're covering two months issues, we'll get straight to the point, with but one comment: "Sleeping Planet" Conclusion took first, and evidently few will be surprised at that—it got nearly straight first-place votes.

However, in the October issue, we can only offer condolences to Herbert Pembroke; his first yarn, "Situation Unbearable" missed the second-place bonus by just 0.02 in the point score. The scores having worked out as thusly:

SEPTEMBER 1964

PLACE	STORY	AUTHOR	POINTS
1.	Sleeping Planet (Concl.)	*William R. Burkett*	1.55
2.	A Case of Identity	*Randall Garrett*	2.34
3.	The Machmen	*James H. Schmitz*	3.00
4.	Sheol	*Piers Anthony and H. James Hotaling*	3.13

OCTOBER 1964

1.	Sweet Dreams, Sweet Princes (Pt. 1)	*Mack Reynolds*	1.54
2.	Flying Fish	*John T. Phillifent*	2.87
3.	Situation Unbearable	*Herbert Pembroke*	2.89
4.	Professional Dilemma	*Leonard Lockhard*	3.33
5.	The Mary Celeste Move	*Frank Herbert*	3.67

THE EDITOR

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HANK DEMPSEY

A Matter of Timing

The importance of the time factor in distinguishing Crackpot, Genius and Clod has been seriously underevaluated. A Clod of course, is one who catches on to the new idea only after everyone else knows it. The others . . .

Illustrated by Robert Swanson

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"And now what happens?" Jeff O'Hare asked, turning a very jaundiced eye towards the wooden box with the row of colored light bulbs set into its top.

"I will proceed to demonstrate," Antonini said. While his long, knobby fingers flashed over the rows of buttons on the back of the box, the colored lights flashed rhythmically. He tossed his long, gray hair back from his face and frowned in concentration. "There is the utmost skill needed in the operation of the Coloromatachrome, almost an art to detect the harmonious vibrations, to sense the disharmonies, and then to select the correct combination—*ahhh*! I have detected an aberration . . . it is coming clearer . . . your thumb, your right thumb, there is badness there . . ."

"There is a hangnail there," Jeff grunted, "as anyone can plainly see." He scrawled a few lines in his notebook.

"A hangnail! I did not see since, of course, my eyes were closed. But now the harmonious vibrations shall cancel out the evil present in your thumb—closer to the box please"—the long fingers flashed and the lights rippled and surged—"healing will begin at once, your flesh will repair itself."

"Most hangnails work that way," Jeff said, nibbling at his. "All right, Antonini, you can throw the switch, I've seen enough. Under the terms of our foundation you qualify for a grant—"

"Aha!" Lights flashed in the dark hollows of his eyes as Antonini drew himself up dramatically, his fingers splayed out on his chest. "Then you believe! You can see the value of my Coloromatachrome?"

"I can see that it is a piece of junk and the whole operation is a con, but my opinions don't matter. Now for the record, what's your first name?"

"You insult me!" Antonini screeched, waving his hands wildly in the air. "You doubt my truths, my discoveries, you seek to mock me! Beware lest my fingers of their own volition leap out and strangle the venomous words in your lying throat . . ."

"Easy," Jeff growled deep in his chest, and when he shifted his shoulders inside his jacket it became obvious that they were solid with muscle. Though he was of medium height, balding and on the wrong side of thirty-five he generated a feeling that here was a man who was not to be played around with: five years in the Marines had left an ineradicable mark. Antonini stopped the arm-waving at once and backed away a few steps.

"That's more like it," Jeff said. "I told you this was just my personal opinion—which you asked for. It has no effect on the grant other than my decision to put you in the lowest category because of the apparent idiocy of your gadget. Here is your book of record forms, some addressed and prepaid envelopes and a booklet of instructions. Read the instructions and follow them in filling out the reports. Mail the reports on the last day of every month and the foundation will send you your check by return mail, in your case it will be for the sum of one hundred dollars."

"For this miserly sum I would never . . ."

Jeff quelled him with a scowl and looked around at the collapsing furniture and dusty hangings of the furnished room. "Save the histrionics for the suckers. From the look of this dump I would say that a hundred bucks is about ninety-eight more than you are making right now. So listen closely. We do not care how many cures you do or do not make, all we care about are accurate records. We check them. If you are caught in one teensy little exaggeration, one microscopic lie in recording the results of your treatments, you will be dropped instantly from our rolls with no possibility of reinstatement. Is that clear?"

"Perfectly," Antonini said defeatedly. He dropped into a chair and began to mumble through the book of instructions. Jeff looked at his watch then snapped his attaché case shut.

"If there are any questions call the foundation, the phone number is inside the front cover of the book. Now I have to move. I'm expecting a long-distance call."

It was a crisp, early spring day and some of the freshness had even managed to slip into the besmogged air of the city streets. Jeff whistled as he hailed a cab. He was still whistling when he pushed open the impressively heavy teak door with the small golden letters that spelled out *Committee for Welfare, Administration and Consumer Control.* Sally Parker looked up from her typewriter when he came in.

"You'll whistle another tune when you see who is waiting in your office," she said.

"No one is ever permitted to wait in my office."

"Your abstemious life is ruining your memory. Miss Parker—and I'm quoting you now—Miss Parker, if any gentlemen with flat feet cased in size fourteen shoes come while I'm out be sure to let them wait in my office. Always. End of quote."

"The law!" Jeff's eyes narrowed in thought. "I wonder what's brewing this time." He banged through the door into the inner office to scowl at a large man with one hand in his jacket pocket who was standing by the window. "My name is O'Hare. What can I do for you?"

"Mannheimer, Detective Division." The big man worked his buzzer clumsily out of his pocket with his left hand and flashed it. He kept his right hand in his pocket.

"Pleased to meet you, Sergeant Mannheimer. What is it you want?"

"We've had a complaint come in—"

"About me?"

"No, this was about some phony by the name of Akakaka, who it turns out has been getting money from your foundation and we want some information . . ."

"Just one moment, sergeant."

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Jeff went to the row of file cabinets and pulled open the *A to D* drawer and flipped through it, then returned to the desk with a folder in his hand. He flipped through it.

"Yes, I remember him, a pleasant old gent—must be over ninety at least—now, what can I tell you about him?"

"Everything. If you'll turn over your files to us, they'll be valuable evidence for the prosecution."

"I can't do that, Sergeant Mannheimer." He closed his file and rested his clasped hands on it. "Our files our confidential. I'll answer what questions I can to aid you, but I can't let you use our facilities." A more alert man than Mannheimer might have noticed a sudden cooling of O'Hare's tones.

"You got a responsibility as a citizen," the detective growled, frowning so that his beady eyes were lost behind the beetling escarpment of his eyebrows. "This Akakaka is a phony with a mindreading act to sucker the rubes. You want to side with him O'Hare you're aiding and abetting a criminal and we can have you in jail right beside him. Play ball with us and we help you—cross us and you'll be hanging on the bars in the city jail."

"Don't try to frighten me, you microcephalic shamus!" Jeff bit out as he dropped the file into the desk drawer and clicked the lock. "Before you take off after me you better be sure your own laundry is clean. You don't have a search warrant, yet you attempted to open my confidential files in my absence—and *that* is a criminal offense."

"Whadda you mean!"

"I mean why don't you take your right hand out of your pocket? All of my files are booby-trapped as well as locked, so that anyone who tries to open them gets a handful of red dye that has to wear off because it can't wash off—and what color is *your* hand, Mannheimer?"

The big detective was on his feet now, and if the color of his hand was unknown his face was certainly glowing a healthy red with rage.

"I heard all about you, O'Hare," he shouted, "but I wanted to give you a break. That was my mistake—and it's not going to happen again. I don't know what kind of a queer racket you got operating here but we got our eye on you downtown, yes we have, and we're going to get you—

"You're going to get yourself in trouble, pinhead," Jeff said coldly, "since I am recording this entire conversation—threats and all. For your information—and your partners downtown, I'll see they get a copy of this tape—this is a nonprofit, benevolent foundation legally organized under the laws of this sovereign state and dedicated to paying grants to research workers who meet our exacting qualifications. Our money comes from the trust fund left by the late Wolfgang Schlussel, an industrious gentleman who made a small fortune in the pork-packing business.

"At the age of fifty-four Mr. Schussel was stricken by stomach cancer and when an expensive series of treatments had proven ineffective he was given up for dead. His doctor ordered an extra supply of morphine and told Mr. Schlussel to make his will and resign himself to his fate. Mr. Schlussel made his will but resigned himself to nothing, he had a lot of money and loved life. Since normal medicine had failed him he tried what might be called abnormal medicine and eventually found a woman in a swamp in Mississippi who cured him with snake oil treatments—"

"A quack!"

"I've heard the term mentioned before. In any case Mr. Schlussel's doctor called his cure a spontaneous remission and forgot about it. He did not. He wanted to help others who suffered as he did, but unhappily the snake oil woman died soon after that. Mr. Schlussel enjoyed ten more years of a happy, productive, pork-packing life until he fell victim to a gall bladder infection. Unhappily for him there were no gall bladder quacks around and he died, but he did leave all of his money to start this foundation to uncover other treatments and techniques that might help the lot of suffering mankind.

"Heeding the considered advice of a battery of high-priced lawyers, the organization was founded in the form you see it today. It is a research body, pure and simple, that seeks to uncover the unorthodox and publish the results of its findings. We give grants to anyone who develops a new technique or invention in any field, and who cannot receive funds from any of the normal research sources. It does not matter if the device or method appears to be a fake or useless—our function is not to make value judgments but simply to collate facts.

"People who receive our grants make regular reports on their progress, which are cross-checked for accuracy of reporting—nothing else. At the end of each year the collated results of these reports are published in book form." He picked up a thick, dark volume from his desk and showed it to the glowering detective. "That is all we do. The development and exploitation of the discoveries is completely up to the people involved. So are their personal lives, their marital affairs and their relations with the police. All I can tell you about Guru Akakaka is contained in this book which is probably in your police files. If not, I will be happy to sell you a copy. Seven dollars. It will tell you all you need to know about the CWACC, the Committee for Welfare, Administration and Consumer Control."

"You're all quacks!" the detective stormed. "You're quacks in the CWACC helping other quacks—"

"If you intend to do only duck imitations, sergeant, you might as well leave."

"Don't get funny with me!" Mannheimer stormed, shaking his fist across the desk.

It was his right fist. It was bright red.

"Well now, just look at that," Jeff said with his warmest smile.

The detective was stuttering with rage, beyond words, outfought, outclassed and defeated on all fronts. Some

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measure of realization must have penetrated to his adrenalin-soaked cortex because he clamped his jaw shut in mid-growl, turned on his heel and stamped from the room. The door had a damped, self-closing mechanism on it so he could not have even the minor relief of slamming it shut behind him.

Jeff followed him out and watched the front door close with great satisfaction. Sally had the earphones on, listening to a playback of the conversation, and was shaking her head and making *tssk, tssk* noises.

"Such language," she said, "and you weren't very polite to him at all."

"Why should I be? He's a well-known member of the city hall bunch, the bribe and ticket-fixing crowd, and I caught him really red-handed trying to go through my files. Let's see your legs."

Sally, still listening to the tape, swung her legs out from under the desk and hiked her skirt up above her knees. They were lovely gams at any time, and their presence now soothed away some of O'Hare's anger. Even the vile, mottled purple color of her thin stockings could not detract very much.

"How are they holding up?" he asked.

"Look for yourself. Going on eight months now that I have been wearing them every day in the office. No runs, no rips, no tears, no nothing."

"Maybe if you wore them home, normal use, streetcars and buses and suchlike, there might be some signs of wear."

"I will not!" she pulled the skirt down primly and swung her legs back out of sight under the desk. "It's bad enough here in the office where no one can see them—but *I* know they are there and only do it because of the twenty-five dollar a month research grant that you pay me. They just look *horrible* on my legs." And they did, too, Jeff was forced to admit to himself. Sally's skin was a rich, velvety brown that clashed with the streaky purple.

"Do you think Mr. X will ever come back?" Sally asked.

Jeff just shrugged, there was no way of knowing. The mysterious man whom they called Mr. X in the records had appeared one day and pressed a package with the stockings into Jeff's hands, muttered something about lasting forever—and vanished. They had heard nothing from him since, nor did they know what material the stockings had been manufactured from.

"If that call comes in from Ecuador take it yourself, and tell him *No hay reglas fijas*," Jeff said. "I'm going to be tied up on the Hot Line for a while, no interruptions if you please."

"Roger, Boss—*No hay reglas fijas*."

In his office Jeff threw the switch that sealed the door and opaqued windows, generated a high-pitched hum in walls, ceiling and floor that would interfere with any amplifying microphones that might be eavesdropping, and broke all the telephone, intercom and electric circuits that entered the room. The lights flickered as the storage batteries took over and he unlocked and opened the bottom drawer of his desk and took out the ordinary looking telephone concealed there. This was the Hot Line, a phone of his own invention and construction, and almost impossible to tap.

In the office building directly across the street was a telephone that was listed under the name of the imaginary firm that rented the office. It was connected to this phone by the immaterial link of a beam of modulated infra-red light, invisible and indetectable without the proper equipment. He was sure the police had his ordinary phones tapped by now, and if they were watching they knew he was in the office, so they *knew* he couldn't be making any outside phone calls. They had a surprise coming. He pressed the *dial* button and dialed a number and in instant obedience the telephone across the street dialed the same number for him. When he heard the ringing signal he pressed the *speak* button.

"You are talking to Guru Akakaka," a high-pitched and tremulous voice said.

"Someone has called in the fuzz," Jeff said, then hung up.

The call, made through the automatic equipment in the exchange, had been too brief to be traced—and the guru was now warned. Jeff had not been exactly truthful when he told the sergeant that he never interfered with the people who had grants from the foundation. He really didn't want to get involved, but there were times when he was driven to take a hand. Like now. The guru was a charming old rogue who specialized in seeing the future, usually in the form of touting stock market tips to elderly widows and taking a cut of any profits they might make by following his advice. If they lost money, he explained that this was always caused by negative radiation from the black stars of space and the only way to lick the black stars was to take another flier on the exchange. Occasionally one of the widows looked at her bank balance and called cop—which was probably what had happened now.

The police took a dim view of this racket, though Jeff, with a different code of standards, did not see much harm in it. The girls would still take chances on the market, with or without the guru's help, and they could well afford it. And it was to the foundation's interest to keep guru Akakaka out of the can: he knew nothing about the stock exchange—he just read the lists of names in the daily paper—but his predictions for rising and falling stocks were running far ahead of random. Perhaps he really could see the future, that was what they wanted to find out.

Just as Jeff was sliding the Hot phone back into the desk there was a muffled hammering on the heavy door.

His instant reflex was to push his thumb up against the top of the kneehole in his desk and catch the .38 revolver

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that dropped into his hand. Sally would never permit him to be interrupted when he was on the Hot Line, not even if the building were burning down. That he *had* been interrupted meant that something was wrong, and experience had taught him that, in this sort of situation, a .38 in the hand was worth two in the desk. He threw the switch that unlocked the door and aimed the pistol through the thin plywood that formed the desk's front.

The door burst open and a fat, sweating man staggered in dragging the protesting Sally after him. She had a firm grip on his arm and was beating him over the head with her thick and solid purse.

"Save me!" the man gasped, trying to shield his head from the blows. "I must see . . . you Mr. O'Hare . . . excuse the interruption but it is . . . most imperative OUCH!" The purse had caught him a good one across the ear.

"You can release him, faithful sentinel," Jeff said, and pushed the gun back up into the desk. "This is one of our oldest grantees, Dr. Eusabious . . ."

"Dr. Hampstead, if you please, Mr. O'Hare. A certain difficulty in Chicago . . . the name . . . you know . . ."

"I do indeed. This is Dr. Hampstead, Miss Parker."

"He could have waited," Sally sniffed, and patted her hair into place coldly.

"The exigency of the moment, dear lady . . . please accept my most profound apologies . . . a certain matter of speed . . . the police."

"Did anyone see you come in here?" Jeff interrupted.

"Not into this office, no, I was most careful . . . though I know I was followed."

"Sally, would you be so kind as to resume your station behind your typewriter and to remember that no one has entered this office since Sergeant Mannheimer left . . ."

"There had better be a perjury bonus in my pay envelope come next Christmas."

". . . And you have never in your life heard of anyone named Dr. Hampstead."

The door closed behind her and Hampstead had just settled into a chair when Sally's voice came over the intercom. "Sergeant Mannheimer and another gentleman to see you."

"Please show them in," Jeff said into the intercom, then held down the button that switched on the bone conduction earphone she wore concealed under her hair. "But NOT for at least fifteen seconds!" He switched off and dived for the file cabinets.

"I'm glad every day is not like today," he sighed as he tugged on the *K to L* and *S to T* handles at the same time. One vertical row of cabinets slid forward smoothly and opened out like a door: a small room was visible beyond. "In there, Doc, and quickly, even though it's quite a tight fit."

Hampstead grunted and forced his way in. "Sorry to . . . put you to the trouble . . ." Jeff kicked a torn-off coat button in after him and swung the files into place again. He dived for his desk, picked a folder off the blotter and the door opened.

"Where is he?" Sergeant Mannheimer snapped, pushing in with another squarish and flatfooted individual treading on his heels.

"I beg your pardon."

"Don't play games with me, O'Hare. A pill-peddling quack by the name of Hampstead was seen to enter this building by Detective Kowarski here . . ."

"Pleased to make your acquaintance."

". . . And was not seen to come out, and Kowarski has a warrant for the arrest of this quack. Where is he?"

"Obviously not here. Did you say he was seen to enter these offices?"

"No, he came into the building, but where else would he go but to the nut club you run here?"

Jeff's voice was as chill as the Siberian night. "That's the last time you will ever use insulting language or accuse me of lying to you, sergeant. This conversation is being recorded and will be used in evidence in court if I chose to file charges against you. Now—you will look around this room and you will see it is empty. You will look around the outer office and see the same. You will note that there are no other doors or rooms leading from either of these offices. Then you will leave by the outer door without one more word and you will not bother me again."

Muttering and fuming the detectives stalked around the two rooms like caged bears, then left. Jeff smiled benevolently and switched on the intercom.

"A thirty-dollar bonus come your vacation time for services above and beyond the call of duty."

"Call it bribery for lying—it doesn't hurt *my* conscience."

With the door sealed once again, Jeff tugged open the file cabinet door and helped Hampstead out through the opening.

"I'm not a young man any more," Hampstead groaned, sinking into a chair and dabbing at his forehead with a neatly folded handkerchief. "It is only because one cannot lay down the burden of service to mankind that I continue, reviled and insulted, yet I go on. The difficulty here is . . ."

Jeff held up his hand as he pulled out a folder and threw it onto his desk. "First things first, doctor. Let's get the record up to date before we proceed. You mentioned that you were no longer practicing under the name Eusabious?"

"Hampstead. Dr. Hampstead if you please, from my mother's side of the family."

"Hampstead it is. Now let me see . . . born . . . educated . . . a B.A. in chemistry . . . Doctor of the Chiropractic Arts. You don't happen to have received any more degrees since I saw you last?"

"Well, in fact I do have one, I have been honored by the title of D.H.A."

"Doctor of the Healing Arts—that must be from the

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diploma mill in Kansas, hundred bucks and you're a doctor by return mail."

"One hundred and fifty, my boy, these are inflationary times, a fine document indeed, genuine sheepskin."

"That gets us up to date—unless you have anything more to add to the records about your Little Giant Athlete's Foot Cure?"

"I wish you had not reminded me, my boy, it was a black and embarrassing chapter for all of us. My assistant was to blame, you must remember, for the faulty compounding. *I would never put that much phenol in . . .*"

"Of course, Doc."

". . . And the last case is out of the hospital now, the skin grafts took quite nicely. I beg you to forget that unfortunate incident. My present affairs have taken an entirely different turn and with the aid of my miracle Formula 21-X I have been alleviating the ills of mankind."

"I want to hear all about it," Jeff said, taking a bottle of very old bourbon and two water glasses from a drawer. "Could your vocal chords stand some lubrication?"

"My vocal chords are at their salubrious best, as always," Hampstead said, quickly putting out his hand. "But if that is nerve tonic I am greatly in need of a double restorative." He smacked, sighed, lowered the level halfway and settled back comfortably in his chair.

"Formula 21-X is the result of years of patient labor, thousands of laboratory hours, the fruit of my genius and has been totally rejected by entrenched medical establishment. But I have borne this burden before. I owe a duty to suffering humanity and at my own expense and with great personal sacrifice I have set up a small clinic in one of the poorer sections of the city, where I specialize in the ills of the Nose, Throat and Lungs which are almost endemic in this neighborhood at this time of year."

"How have you been doing?"

"Very well—up until now!" Anger flashed in Hampstead's slightly bloodshot eye and he drained the rest of his glass. "I am everyone's friend and know no enemy —save one. My Formula 21-X is so effective that I have been handling only cases the other doctors could not cure. Children are most prone to these respiratory infections and when they have suffered for months without improvement—but *with* great medical bills—they are brought to me. I prescribe a body flushing diet, lung cleansing breathing exercise, throat strengthening gargles —and a bottle of my Formula 21-X. That is all. I charge one price, five dollars, and have heard mothers weep with joy at the miracle my treatment performs. Rich and poor come to me, including the offspring of three of our city's policemen, which explains in part my freedom from persecution. But I have an enemy, a certain general practitioner y-clept Meegan. By trickery he has obtained some of my Formula 21-X and had it analyzed. He claims it is valueless—my formula that has cured eighty-seven of his suffering patients whom he treated to no avail!"

"He blew the whistle on you?"

"Correct." Hampstead stared gloomily at the dry bottom of his glass. "And I am afraid that I am in need of funds to move on to a more friendly location."

"That might be arranged," Jeff told him, refilling their glasses. "But you know the rules to qualify for a grant. Accurate records kept on our forms, and in this case I'll need to know your gargling, breathing and flushing routines—as well as having a sample of the miraculous 21-X."

"I have kept the records carefully, as I always have done, but they are in my office. I'm afraid the minions of the law are already there, watching it."

"We'll find a way to get them. What about the medicine?"

"I hesitate . . . a secret formula . . ."

"But your Dr. Meegan has a sample, so there should be no harm in letting me have one."

"Still . . ."

Jeff took a green cash box from the locked file and opened it on the desk. It held a number of green and crisp banknotes. "I'll tell you what I'll do. The foundation will give you a grant of two hundred dollars a month for a period of one year and, considering the fact that you have been working on this project for some time, we will back date it a year so you can collect the entire sum now. Two-thousand four-hundred dollars." He took out a package of bills and twisted it so that they crackled.

"Done!" Hampstead said, and dropped a bottle of smoky liquid onto the desk. He followed it with a dog-eared sheet of instructions about the cure.

"Just sign this application form and fill in the date. Then we'll think of a way to get those records out of your place."

The office emergency rations—a can of Spam and a box of crackers—were more than satisfactory to Hampstead, and in the evening Jeff left him locked safely behind the pick-proof office doors. Since he was being followed by at least two city detectives, Jeff went to one of the most expensive restaurants in town, both for his own pleasure—since he was on the job this would appear on his expense account—and to gouge some money out of the stuffed city coffers. Besides, both cops looked as though they could use a good meal. Four hours, seven courses, a bottle of wine and a good cigar later, he sighed, pushed back his chair and gave his tails the shake. He used the last-minute trolley car exit trick, the multiple-entrance hotel gambit and the movie theater slip. Once clear of his followers he made his way back to his office by a route of his own devising and awoke the snoring Hampstead.

"We're on the way."

Hampstead smacked his dry lips and knuckled the sleep from his eyes. "Perhaps a stirrup cup first, my boy, to start us along the road."

They had one, and Jeff ticked off the various entrances to Hampstead's apartment.

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"The front door is out, sure to be watched. And probably the alley exit, too. What about over the roof from the next building? Or the fire escape?" Hampstead groaned.

"It's a six-flight walk-up, and I am no longer young. But it is far preferable to the acrobatics needed to mount the fire escape. Shall we go?"

"In half a moment—I have to change into my working clothes."

Hampstead looked on interestedly as Jeff slipped into a short, black jacket, knotted a scarf to cover his white shirt, and put on dark, gum-soled shoes and a navy blue beret. Then he tried on a pair of dark-rimmed glasses and a full, black, long and patently false beard and moustache.

"Aren't you being a bit obvious, my boy," Hampstead asked. "Really, that sort of disguise went out with Sherlock Holmes and the silent movie. You'll only draw attention in that thing."

"I'll only be wearing the thing *after* I've drawn attention," Jeff said, stuffing the mass of phony hair into his pocket. "This is O'Hare unpatented identification-buster. Anyone seeing me in this thing can say the suspect walked like me and was built like and might have been me—but they can't be positive. As long as I'm not caught wearing it, which I don't intend to be, they'll never be sure. Come on."

They took the automatic elevator to the basement and after Jeff's reconnoiter to see if any of the janitorial staff were about, they walked far into the dusty, gray bowels of the building. Jeff stopped before a green metal door and took out his key ring.

"What are we doing here?" Hampstead asked, pointing to the message stenciled on the door in bold letters. HIGH TENSION—NO ADMISSION it read. And 50,000 VOLTS—DANGER, as well as CITY ELECTRICAL ROAD. A large skull and crossbones completed the deadly picture.

"This only proves the power of the printed word," Jeff said, unlocking the door and throwing it open. They stepped through into another basement hallway, painted a slightly different color. When the door closed behind them the wondering Hampstead saw that the warning electrical message was repeated on this side as well.

"Where is the electricity?" he asked.

"Only in the eye of the beholder. I fastened this door against the cellar wall one week end when a new custodian was due to start on Monday. He, of course, accepted it as part of the building and never goes near it. Neither does City Electrical who have never heard of it. I only had to wait a few months, the help turns over fast on these jobs, until the same thing happened in the next building, then knocked a hole in the wall and had my private entrance. This is an apartment building so we'll just walk out like legal inhabitants."

Because Hampstead's apartment-office was in one of a row of connecting tenements they were able to ascend four buildings away and work their way across the roofs. A chill march wind blew a scattering of snow into their faces and aided their concealment. The roof door was locked, but Hampstead had the key. They went through, leaving the door unlocked in case of the need for rapid exit, and descended silently to the ground floor.

"There may be one of them hidden inside," Hampstead whispered as they approached his door.

"A chance we'll have to take. We must have those records," Jeff said. He took the precaution of slipping on the beard and glasses before the door opened, then entered in a swift crouch, hands ready. The office was empty.

"Over there, the loose-leaf books," Hampstead said, pointing towards the dim bulk of a bookshelf.

With the tiny light of his pocket flash Jeff found the books and flipped through them: they were filled with standard CWACC report forms. He took the sheets out of the binders and stuffed them into his pocket just as a rending crash came from the door and it almost fell from its ancient hinges.

"C'mon out!" A voice bellowed from the hall. "We know you're in there!"

"Nabbed!" Hampstead choked.

"Where do these windows lead to?" Jeff hissed.

"They open into the backyard."

"Let's go!" Jeff said, sliding the window open just as another impact shook the door and the top hinge squealed and broke.

"Once more and they'll be in! You first, Doc!"

Hampstead dropped the eight feet into the yard, Jeff steadying him with a firm grip on the arm, and had just landed when the door went down with a crunching roar and the hulking form of Sergeant Mannheimer plunged through.

"Stop! I see you! Stop I say!" he bellowed.

Jeff rolled over the sill and dropped, hoping he wouldn't break a leg. He landed like a cat, jumped up and had dragged the lumbering Hampstead halfway to the gate into the alley before the detective reached the window.

"Stop—or I'll shoot!"

They were around the corner when the first shot cracked behind them and whined away into the darkness. There were no sounds of pursuit yet, other than a metallic crashing and a hoarse cry.

"Sounds as if Mannheimer hit the garbage cans that we just missed! That'll slow him down. Now's the time for a burst of speed, Doc. Around the corner and we'll be safe."

"Sorry . . . afraid I can't . . . bit of a problem I know . . ."

Hampstead was trundling along slower and slower with Jeff half carrying him. He finally slowed to a complete halt and sank down against the wall, breathing heavily.

"The old ticker . . . acting up . . . don't think I can go

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much farther. Could you . . . here in my pocket . . . nitroglycerine . . ."

Jeff pulled out the box of tablets and put two in Hampstead's mouth. A police whistle shrilled and running footsteps sounded down the alley.

"Go on, Jeff. I'll be all right here . . . and a rest in the pokey will be just what I need. There's no point in their getting both of us . . ."

For a long instant Jeff hesitated, while a flashlight swung around the corner and caught him in its glare. "Don't worry," he said. "We'll beat the rap yet—these records will do it." With a twist he was out of the light and running down the alley. Staying wouldn't help Hampstead in the slightest—while if he were free there were a lot of things that might be done.

But he had waited too long. When he turned the next corner there was the sound of more police whistles ahead, and from the side street as well. He was effectively trapped.

"I was getting a little tired of all this running anyway," he said, tearing off his scarf and wiping the prespiration from his face with it, then dropping it to the sidewalk. He dropped the beret, the horn-rimmed glasses and the artificial chinpiece on top of it. Then, with a quick motion he slipped out of his dark jacket, turning it inside out at the same time. This side was made of white nylon with long flaps that had been tucked up and held in place with a few stitches. He ripped these out with a single motion and the flaps dropped to transform the jacket into a three-quarter length raincoat.

Jeff stepped to the curb and stuffed the discarded parts of his disguise into the open mouth of the sewer, then straightened and walked slowly back in the direction from which he had just come. While he walked he took a flattened out fedora from the pocket of the raincoat and pushed it into shape and put it on his head: it was a Borsalino from Italy, the only hat in the world that can't be crushed. From the other pocket he took a pipe, filled with tobacco and containing a nickel-cadmium battery and heating coil so that it lit instantly when he pressed the concealed button and took a deep drag. He was passing under a street light at this moment and he blew out a large cloud of smoke just as Sergeant Mannheimer thundered up and a uniformed cop approached from the rear. Mannheimer started to pass him, glanced at his face and screeched to a stop.

"You're under arrest O'Hare, you can't get away with it!" he grated, and clutched Jeff by the arm. Jeff puffed calmly on his pipe and didn't speak until the harness bull had also arrived.

"What are you talking about, Mannheimer? Do you have a warrant for the arrest? And if—what is the charge?"

"I got no warrant, O'Hare, but with my own eyes I saw you climbing out the window and helping that quack Hampstead in an attempted escape."

"That's quite impossible, since I haven't arrived at Dr. Hampstead's establishment yet. What did the man you mistook for me look like?"

"Come off it—I *saw* you! With a phony beard and glasses and a black coat and beret . . ." His voice slowly died away like a run-down phonograph as he took in the white coat and trim gray hat.

"Was this man you saw also smoking a pipe?" Jeff asked soothingly and in the loud silence that followed the grating of Mannheimer's teeth could be plainly heard.

"Maybe you made a mistake in the dark, sergeant," the uniformed cop said after long seconds of silence had passed. "This guy don't resemble your description and besides, he was walking in the wrong direction. It must have been someone else."

"Quite correct, officer," Jeff said, pointing with his pipe stem at the row of dark doorways on the other side of the street. "For your information I saw a man who fits your description run into one of those buildings over there, perhaps he is the one you are looking for."

"It won't wash!" Mannheimer said hoarsely, still holding onto Jeff's arm. "I'm going to take you in and we're going to sweat you until we find out the truth."

"Yes, you can do that," Jeff said quietly. "And afterwards when I sue you for false arrest and the officer here gives evidence that I in no way resemble the suspect you want, and after I play the recordings showing your prejudice and constant attempts to harry me you will lose the case and if not cashiered from the city's finest, you will be back in uniform and so far out in the sticks that you will have to place a long-distance call to phone your precinct station."

Sergeant Mannheimer's grip slowly loosened as he made inarticulate noises deep in his throat. "Now that's a good fellow." Jeff said as he puffed out a cloud of fragrant smoke, then strolled away.

Once around the corner he quickened his pace before the sergeant had any second thoughts about taking him in under suspicion. It might be hard to explain Hampstead's records sheets in his pocket as well as one or two other things. But once he was gone the matter would die a natural death. A cruising cab halted at his whistle and a moment later he was being whisked to safety.

An ambulance passed clanging and flashing in the other direction and, suddenly depressed, Jeff remembered that Hampstead was still in trouble. He took the cab directly to his office, signed in the night book in the lobby and went straight up to work. While he spread the report sheets out on the desk he was dialing the phone with his other hand.

"Yeah, what'cha want?" a nasal voice asked, half shouting over the background of tinny music and loud singing.

"Is Blackstone there?"

"He's always here when the joint's open." The phone clattered against something hard and Jeff read the reports

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until a rich and mellow voice swam out of the earpiece.

"Anthony J. Blackstone present, to whom do I have the honor of speaking?"

"Jeff here, and I have a rush job for you. Get down to night court ready for anything, you have a new client as of now."

"This is rather short notice, Jeffry, and there are other and quite pressing matters pending."

"You can do your drinking tomorrow and let some of the other shysters take the ambulance-chasing clients tonight. This is an official CWACC matter and the foundation will stand behind your client all the way."

"That puts an entirely different face on the matter, Jeffry. Details, please."

With Blackstone on the job Hampstead would get all the protection allowed him under law, and perhaps a bit more. With this out of the way Jeff relaxed enough to allow himself to concentrate on the reports. By three in the morning he had digested them enough to permit himself four fingers of bottled in bond and a period of rumination. He stood at the window looking down at the sleeping city and ticked off the major points he uncovered.

One: Hampstead had kept careful records on all the patients he had treated, as well as noting their statements as to how long they had been under treatment by other doctors without being cured.

Two: All the patients had been treated by other doctors—unsuccessfully—for periods that varied from one to eight weeks.

Three: All the patients had what Hampstead noted in his own code as B.C.F.ST., a bad cold with fever and sore throat.

Four: All of the patients had been cured.

A lot depended on the truthfulness of Hampstead's reports—but this could be checked. Jeff didn't doubt their authenticity since Hampstead had received CWACC grants in the past. There was very little of merit in most of his nostrums, but he was a model of accurate reporting. The chances were that the record was true, in which

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case Jeff knew what he had to do. By sunrise he had his course of action mapped out. He shaved, ate some caffeine tablets, washed down an amphetamine with some bourbon and felt ready to face the dawn. He put on a clean shirt, a drab gray suit, large, black, square shoes with thick soles, a belted trenchcoat and snap brim gray fedora. The office machine clicked off photocopies of Hampstead's records and these went into his pocket along with the bottle of Formula 21-X. He left.

A large breakfast and four cups of black coffee went down on top of the stimulants and used up enough time until the city was finally waking around him. A call to the Last Chance Bar & Grill found Blackstone returned with the good news that Dr. Hampstead was feeling fine and sleeping easily in the prison hospital. A cab took Jeff to a commercial laboratory where he dropped off the Formula 21-X liquid for analysis, then on to Dr. Meegan's office just in time for the morning visiting hours.

"Dr. Meegan, please," he told the nurse, fixing her with a cold gaze and ignoring the scruffy collection of patients in the waiting room.

"I'll take your name, sir, but you will have to wait your turn."

"I'm Lieutenant O'Hare," he said swinging open his wallet just long enough for her to see the gold badge inside. "I'm here on official business."

"Oh, yes, lieutenant, just one moment, please." She rushed for the inter office.

Jeff went right in and gave Meegan a look at the badge and told him, "Doctor, I'd like some information from you, if you please, about a so-called Dr. Hampstead who was arrested last night. We understand you can be of some help to us on this case."

"Always glad to help, lieutenant, please sit down."

Dr. Meegan steepled his fingers on the desk before him, waiting patiently, looking every inch of the elderly, smooth-shaven, reliable family physician that he was. A man whom his patients liked, who treated and cured their commonplace complaints and who knew enough to send them on for specialized care when it was needed. Jeff sighed inwardly and unfolded the photocopies of Hampstead's records.

"We have discovered that this man Hampstead was treating a number of your patients—without your permission or approval?"

"Of course."

"I wonder if you could give me some information about these patients?"

"Where possible, I will be glad to help."

"Good. I have here a Maria Chavez, aged nine, could you tell me what you were treating her for when she went to Hampstead?"

"A moment, please." Dr. Meegan swung about in the large, black swivel chair and flipped through a card file on the table beside him. "Yes, little Maria, I remember her but wanted to check to be sure. She had infectious mononucleosis, very resistant case."

"And Zoltan Kadyir, aged five?"

"Ahhh . . . yes, that was infectious mononucleosis as well."

Jeff checked five more and received the same answer before he asked, "Is it possible that Hampstead was only treating your patients who all suffered from this same disease?"

"Very probable. We have had a severe winter and infectious mononucleosis has been almost endemic in this area."

"Would you mind telling me just what it is? I'm no medical man."

"Surely. It is an infectious disease characterized by a sudden onset and acute course, there is a persistent sore throat, cervical lymphadenopathy and intermittent febrile episodes . . ."

"Hold on, doctor! You lost me after the sore throat."

Meegan smiled. "Well—you could say swollen glands in the neck and fever."

"It doesn't sound very nice, I can see why the parents would worry if one of their kids got it. Hampstead claims to have cured every one of them of this disease."

For the first time Dr. Meegan lost his professional calm; this was obviously a topic that touched him deeply. "The man's a fraud! A quack! You can't cure an infectious disease by gargling and breathing deep and taking this quack potion—why it's nothing but sugar and water and some antihistamines and an ordinary decongestant, the kind that is found in any cheap cough syrup that you buy across the counter."

"Then Hampstead's treatment won't cure infectious mononucleosis?"

"Absolutely not! If anything, it should make it worse."

"In the report I received it said that you had obtained a sample of Hampstead's nostrum and had it analyzed."

"I did indeed, I have it right here." He took a half-filled bottle and a sheet of paper from a drawer. "Here is the laboratory report as well. I have felt for a long time that this quack was a threat to the health of the community and, since the authorities were doing nothing to stop him, I investigated him myself. My niece, aged eight, has a difficult case of infectious mononucleosis and I had her mother bring her to this man. This is the sample I have obtained."

"You let the quack treat her?"

"No, of course not, just to prescribe. I kept the potion here."

"Then your niece is well?"

"As I said, she has a difficult case, very resistant to treatment. She is still ill."

"All of Hampstead's patients seemed to have been cured by his treatment, certainly it wouldn't have hurt to try it—"

"Lieutenant O'Hare, you are not a doctor," Meegan

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snapped out the words, his nostrils white with anger. "I do not tell you your business and you shall not tell me mine. Under no condition could a qualified physician consider this nonsense legitimate treatment."

"But—"

"Good day, lieutenant. There are patients I must see."

Jeff picked up his hat and left. When he opened the door he came face to face with a gaping Sergeant Mannheimer.

"Good morning, sergeant, the doctor will see you I know." He stepped around the rooted and massive frame and left. He would have enjoyed the forthcoming conversation when the name of O'Hare was mentioned, but there were more important things to do.

His first stop was the laboratory where he found the report waiting for him. He read it in the cab uptown and Hampstead's Formula 21-X seemed to be just as Dr. Meegan had described it. The cabby gave him change and he climbed the gray granite steps and dived into a phone booth.

"Committee for Welfare, Administration and Consumer Control, good morning."

"This is your employer, what's new?"

"I'm very glad you called Mr. Synkowicz, perhaps you can locate Mr. O'Hare's attorneys. There are two policemen here who say they wish to arrest Mr. O'Hare."

"That's what I expected, but it's an easy rap to beat, impersonating a police officer, I imagine?"

"That is correct."

"Keep them busy. Show them your legs if they get restless. I won't be in until tomorrow at which time this matter will either be cleared up or I'll be in so deep I'll get ninety-nine years at hard labor."

"And good luck to you, too, Mr. Synkowicz. The Guard dies, but does not surrender."

"General Cambrone said that at Waterloo in 1815 but *he* didn't die until 1842 and they lost the battle, which proves something or other." He hung up and entered the library of the Medical Center.

What he planned to do was brush up on the history, cure, treatment and relevant details of infectious mononucleosis so that he could talk about it intelligently to the specialists he was planning to employ. If there was anything at all in Hampstead's treatment, they might uncover it, or at least prove its existence, and there would be a strong case for his defense in court. Jeff had not expected to find pay dirt, the mother load, the answer within one hour, but he did.

"Eureka!" he shouted under his breath and looked at the news item in his hand. While it was being photostated he went back to the phone booth and verbally worked his way through the hangers-on and employees of the Last Chance until Blackstone came to the phone.

"How does it look?" Jeff asked.

"Better than I hoped—but still bad, Jeffry. No one wants to throw away the key on Hampstead, not with his bad heart and air of innocence. Plus the more important fact that one of the turnkeys and a few officers of the police have had children treated successfully by the man. I'm sure, with a little greasing of some palms as they say in the vernacular, that we could get him off with a suspended sentence and a fine—if it were not for the charges brought by a certain physician."

"Dr. Meegan?"

"Your sources of information are of the finest."

"What if Meegan should withdraw charges, any chance then?"

"If such were the case, I could guarantee that by this time next week the happy Mr. Hampstead would be basking his corpus under the Florida sun."

"I'll forward pass, Counselor—you carry the ball."

He hung up and rushed for another taxi, this time with some of the spring gone from his step. It had been a long night and was turning into a longer day—but the end of the trail was in sight.

"What are you doing here, you impostor?" Dr. Meegan asked angrily when Jeff came into his office. He reached for his phone.

"I'm here to talk to you, doctor, I'm not an impostor, and you can put the phone down because your nurse has already called the police to inform them of my presence.

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We have just enough time for a chat before they come."

"I have nothing to say to you. You claimed to be a detective lieutenant and showed me a false police badge."

"I did not. I introduced myself as Lieutenant O'Hare which is correct, I hold a commission in the Marine Reserve. Officers in England use their titles in civilian life but I see I must break myself of the habit since it seems to lead to misunderstandings here. The badge I showed you was to identify myself to you." He opened the badge on the desk and Dr. Meegan gaped slightly when he read the lettering on it. JEFFRY O'HARE it said, and DIRECTOR OF CWACC.

"But all this is not important now, it is more important that we discuss you and your charges against Hampstead, whose only crime is to be ahead of his time."

"There is nothing to discuss."

"I think there is. Might I ask you a question. Is there anything a patient can do when a doctor makes a faulty diagnosis and prescribes the wrong treatment?"

"Of course. The patient can sue for malpractice."

"Remember, doctor, you said it—I didn't. Now I'm going to read to you from a report of a recent meeting of the American College of Allergists. It is about pseudomononucleosis, an apparently new disease indistinguishable clinically from infectious mononucleosis . . ."

"Let me see that," Dr. Meegan said, reaching out for the clipping. As he read it the lines in his face deepened until, when he slowly put it down, it was obvious that he was an old man. Jeff forced his voice to be neutral.

"You see, doctor, Hampstead was treating a disease you did not identify. You'll notice that the recommended treatment of pseudomononucleosis is basically that of any chronic nasal allergy: oral decongestants, saline irrigation to reduce secondary infection and sore throat, raising of environmental humidity. Which is another way of saying take Formula 21-X, open the windows and gargle."

"But . . . this meeting was only a few months ago, there is so much being published, so many new drugs, it is impossible to keep up with the literature . . ."

"That is not what you told me earlier today. It was black and white then. You were always right and a quack must always be wrong. But this quack's only mistake was in being a little ahead of his time. The allergists have done a good job in uncovering this disease, but they are wrong when they call it new—what they mean is newly discovered. It has been there for a while or they couldn't have discovered all the cases and Hampstead could not have been treating it, with your help. You weeded out all the cases of real mononucleosis so that the only ones left were the pseudo variety. Apparently the other doctors did the same thing. Then Hampstead took the cases you couldn't treat and cured them. You told me a quack must always be wrong—yet in this case *you* were wrong for not looking into his cures to see if they were real or not. So help the man. He will leave this state and never bother you again, if you drop the charges against him."

"I . . . I cannot—"

"You have eighty-seven patients to whom you gave incorrect treatment, who Hampstead cured. They won't enjoy seeing you testify against him in court—and they are eighty-seven possible malpractice suits."

"Are you threatening me, sir?"

"Not at all, just pointing out facts. And one last fact. You are going to treat your niece with the remedy the College of Allergists recommend—and this is Hampstead's treatment, the one you are having him prosecuted for using. Are you being fair?"

The silence lengthened and the room was so quiet that the slow ticking of the immense grandfather's clock was clearly audible. Then Dr. Meegan sighed, and it was a sound of defeat.

"I'll drop the charges as you suggested. I really have no other choice."

"A wise decision, doctor, and I congratulate you on it. I think you will find that everyone—yourself included—will be much the better for it." There was a knocking on the door and Jeff rose and opened it, smiling at the familiar, rage-filled face that loomed there.

"Come in, Sergeant Mannheimer, do come in. We have all kinds of interesting news for you."

(Extract from an article that appeared in THE MEDICAL TRIBUNE on March 27, 1964)

ALLERGIC ENTITY REPORTED TO MIMIC INFECTIOUS MONONUCLEOSIS CLINICALLY

MIAMI BEACH, FLA.—Pseudomononucleosis of allergic origin, an apparently new disease entity indistinguishable clinically from infectious mononucleosis, was described by a Massachusetts allergist at the American College of Allergists 20th annual congress here.

Dr. Bernard A. Berman of Brookline, Mass., detailed its occurence in 16 children, all of whom improved following allergy therapy.

The most important clinical signs of the syndrome, he said, are presistent sore throat, cervical lymphadenopathy, and intermittent febrile episodes, which may also be typical of infectious mononucleosis. However, clinical findings differ on two counts: the absence of spenomegaly and of a high percentage of atypical lymphocytes.

The 16 patients ranged in age from four to ten years old and included an equal number of boys and girls. Most had been ill for two to four months, "and because they were sick so much of the time, they had missed considerable periods of school."

Environmental factors, such as relative humidity, are presumably important in the pathogenesis of this condition, he added. All but one child lived in a home heated by a forced hot-air system known to be associated with very low humidity, and almost all felt better when relative humidity was increased to satisfactory levels.

The management of pseudomononucleosis is basically that of chronic nasal allergy, he said, with oral decongestants for the relief of nasal congestion, and saline irrigation to reduce secondary infection and sore throat.

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An evaluation report on something
obviously includes not only
the objective utility of the device,
but also whether its use makes
the evaluator
extremely uncomfortable . . .

FINAL REPORT

Richard Grey Sipes

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FINAL REPORT
TEST OF RADIO SET AN/PRC-1184(XE-1)
Task Assignment 37-64-0611

AUTHORITY

Authority for this test is documented under approved USAEPG Task 37-64-0611, "Evaluation of Radio Set AN/PRC-1184(XE-1)" of the FY-64 United States Army Electronic Proving Ground Technical Program, as approved by OCSigO.

OBJECTIVE

This test was conducted to evaluate Radio Set AN/PRC-1184 (XE-1) regarding feasibility of its use as a voice radio communications device.

I. BACKGROUND

Radio Set AN/PRC-1184(XE-1) was developed by PsiCo Electronics Development Laboratories, Salem, Massachusetts. Its development was independent and unsolicited by the Signal Corps or other governmental agency. Five sets were submitted for test and evaluation by PsiCo EDL on 14 June, 1966. Three of these sets were furnished USASRDL, Fort Monmouth, New Jersey, and are now undergoing laboratory tests at that facility. No report has been forthcoming as of this date. Two of these sets were furnished the USAEPG for field test and evaluation. A Field Representative of PsiCo EDL was assigned to the AN/PRC-1184(XE-1) test group on arrival of the equipment ten months ago. Due to lack of technical qualifications on the part of the Field Representative, the USAEPG requested his recall after two months. The second representative from PsiCo EDL also showed a lack of technical and personal qualifications and was replaced after one month. The third representative possessed marginal qualifications but was retained for the duration of the test period (two months). This rapid turnover of company personnel delayed completion of evaluation and reports. Unexpected retirement and sick leave initiated by Civil Service and military personnel assigned to the task also contributed to the delay.

II. DESCRIPTION OF EQUIPMENT

1. GENERAL.

Radio Set AN/PRC-1184(XE-1) is a portable radio transceiver designed for voice communication in the field. The set weighs one pound and two ounces, including the headband and internal battery. Three-quarters of this weight is contributed by the case, which is of laminar construction (five layers of steel and four layers of an unidentified woodlike material). (See Figure 1)*

A. The transmit-receive section consists of a sealed cylinder with six terminals and is designed to be replaced as a unit.

B. The control section consists of the 20-position CHANNEL

*The figures referred to are too highly classified for publication in this magazine.

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SELECTOR SWITCH and the ON-OFF switch (Figure 2). Since the equipment is claimed capable of simultaneously transmitting and receiving, there is no customary transmit-receive selector switch and no push-to-talk switch.

C. The antenna is nonexistent, as such, and the manufacturer claims that the outer steel layer of the case acts as an antenna.

D. The power source is a commercial 6v battery, 1.9 by 1.0 by 0.6 inches.

2. OPERATIONAL.

The AN/PRC-1184(XE-1) has an unlimited maximum and minimum design range claimed for it. It also is claimed by the manufacturer's representative that it operates in the cw mode. The outer case layer of the set allegedly rceives the signal. This signal supposedly is amplified and presented to the operator by means of a flexible plastic band 1.3 inch in width and connected to the set by a 3-foot 2-conductor cable. This band is worn around the head of the operator. It functions presumably by carrying a signal which impinges, by induction, directly on the aural centers of the operator's brain. This band also serves to replace a microphone and ostensibly picks up the unvocalized speech of the operator, the signal of which is fed to the transmit section of the transmit-receive unit where it is amplified and supplied to the outer case layer (antenna) of the equipment. Both the transmit and receive functions of the equipment are controlled by the 20-channel selector switch (although this has no apparent connection to the transmit-receive unit) and any of the 20 channels can be used for operation. The "antenna" appears to possess omnidirectional characteristics. The manufacturer claims the equipment operates in the X-band. Further technical characteristics are presented in Appendix A, although USAEPG personnel were unable to verify these characteristics and they are presented as supplied by the manufacturer.

III. TESTS

1. MAXIMUM AND MINIMUM RANGES.

A. Objective. To determine the maximum and minimum ranges at which the equipment can be operated under field conditions.

B. Method. A total of twelve survey transmitter sites were used (Figure 3). The distance from transmitter sites to the single receiver site varied from 20 feet to about 2,050 miles (Table I). No orientation or calibration of the equipment was performed prior to test. Each of the 20 bands was tested at each transmitter site. Twelve formal messages (four in code and eight in uncoded form) were utilized in each channel-test site combination. Each message contained a minimum of fifty words and no two messages were alike. Three operators were used at the transmitter sites and three operators at the receiver site. Operator combinations were randomly selected (Table II). The

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operators used in this test, and in the other tests, were radio operators supplied by Fort Huachucha.

C. Results. All messages apparently were received in undistorted and complete form in all tests, with the exception of the first five or six received by each operator. Subsequent re-runs of these garbled messages indicated that the trouble could be interpreted as stemming from the operator's lack of familiarity with the mode of signal presentation (see 5. EASE OF OPERATION AND MAINTENANCE).

The effective range of the equipment could be looked upon as at least 2,000 miles and message clarity at that range seems to indicate a much greater maximum range. As a matter of fact, it was impossible to distinguish between presumed output signal strength at 2,000 miles and at 20 feet, although the manufacturer claims that no AVC circuit is used. Microwave propagation characteristics in the X-band prohibit such ranges, and the equipment's discrepancy in this regard is compounded by the fact that terrain features do not interfere with signal transmission. Subsequent informal tests indicated that the AN/PRC-1184(XE-1) apparently could receive, with no noticeable attenuation, when operated within a room shielded against all electromagnetic radiation.

No explanation can be offered for these discrepancies in equipment operation. Conferences with the manufacturer's Field Representative on this subject were unfruitful and it was during this period of test that the first of the representatives revealed his lack of technical qualifications by insisting that these results did not represent an operational discrepancy but indicated desirable equipment characteristics. This interpretation was rejected in light of the fact that it is well known that any piece of electronic equipment which operates at the claimed frequencies, and which is in good repair, will not exhibit such characteristics. Moreover, the representative quickly reverted to nonstandard terminology and concepts in his attempts to excuse the equipment discrepancies. The manufacturer recalled this representative, at USAEPG request, shortly before the end of the range tests.

2. FIELD STRENGTH AND PATTERNS.

A. Objective. To determine the pattern of the emitted radiation and its strengths at various ranges.

B. Method. The testing equipment used in this test is listed in Appendix B and represents all the types available in the USAEPG test laboratories and from local USAEPG contractors. Standard test plans (Appendix C) were utilized.

C. Results. No measurements of field strength or pattern were possible. Despite all efforts, test personnel were unable to pick up any signal on any test equipment even when seemingly effective use was being made of the equipment by operating personnel at ranges up to 330 miles between transmit and receive

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points. In addition to X-band frequencies, tests were made of the remainder of the spectrum but with no results. It was almost as if the AN/PRC-1184(XE-1) was emitting no electromagnetic radiation whatsoever.

The replacement Field Representative was unable to supply a satisfactory explanation for this discrepancy and, after competent and highly qualified Civil Service technical and scientific personnel had refuted each excuse, he finally refused further comment. This operational discrepancy in the AN/PRC-1184(XE-1), although apparently not adversely affecting performance, must be viewed as highly serious and confusing since it prohibits standard tests of equipment operation.

3. SUSCEPTIBILITY TO DETECTION AND INTERFERENCE.

A. Objective. To determine the susceptibility of the equipment to natural interference, such as atmospheric discharges, et cetera; to random man-made interference, such as commercial broadcasts, et cetera; and to enemy electromagnetic detection and subsequent jamming.

B. Method. Records were kept throughout the entire period of test of any evidence of natural or random man-made interference. The equipment was operated for over 1,875 hours in a highly populated electromagnetic environment at USAEPG. Interdepartmental co-operation was arranged with the Electronic Warfare Department at USAEPG and that group planned and conducted an EW test on the equipment. This was considered a separate test to be credited to the EWD and they insisted on publishing their own test plan and test report and on classifying them SECRET. Consequently, only a general statement of results can be presented in this report.

C. Results. No evidence of interference from natural or man-made sources was noticed during the six months of test. Results of EWD tests were entirely negative. Operation of the AN/PRC-1184(XE-1) was impossible to detect or to jam.

Although these might, at first glance, be interpreted as highly desirable characteristics in a radio set designed for battlefield use, it is imperative that we push beyond superficial appearances and considerations to recognize that these characteristics run counter to all existing theory and practical experience concerning electronic equipment. In addition to this serious drawback, we are compelled to point out that the Free World would be in an exceptionally disadvantageous position if such equipment were to be captured or stolen by the Communist Bloc and duplicated by them. At the present state of the art we would be unable to interfere with their operation of such equipment. The consensus of opinion among military personnel assigned to the task is that this type situation must be viewed disfavorably and that it casts a strong shadow over potential use of the AN/PRC-1184(XE-1) by the U. S. Armed Forces. The manufacturer's representative refused comment on this interpretation.

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4. DURABILITY UNDER FIELD CONDITIONS.

A. Objective. To determine the susceptibility of the equipment to malfunction and/or damage under field conditions in the hands of tactical troops.

B. Method. The two AN/PRC-1184(XE-1) sets were supplied to untrained troops during a recent two-week field exercise. Two USAEPG technicians accompanied the troops using the radio sets and took extensive notes on the conditions to which the sets were subjected and on failures resulting from these conditions.

In addition, unscheduled tests were conducted at USAEPG in a final attempt to render the sets inoperative. These consisted (1) in inadvertently leaving one set in an arroyo just prior to a thunderstorm and recovering it (on direct order of the USAEPG Technical Director and at considerable expense) four miles downstream after the storm; (2) in dropping the other set, by error, in front of the left-hand tread of an advancing M-47 tank; and (3) in unauthorized use, by barracks maintenance personnel, of one of the sets as a hammer over a two-hour period.

C. Results. No equipment malfunctions were experienced during the two-week field exercise despite the fact that the reports indicate the two sets were used as footballs on four separate occasions. No equipment failures were recorded during the remaining time the sets were in use at USAEPG.

This resistance to damage and malfunction cannot be considered entirely without negative aspects. Maintenance personnel would acquire extremely little familiarity with such equipment and, if a malfunction did occur, would have almost no experience on which to base action. Moreover, it cannot be forgotten that such durability breeds carelessness in the minds of troops for other equipment. The replacement Field Representative became quite abusive when asked of the possibility of rectifying this undesirable equipment characteristic and his recall was requested by USAEPG.

5. EASE OF OPERATION AND MAINTENANCE.

A. Objective. To determine the training time required for inexperienced personnel to effectively operate and maintain the equipment, and the fatigue experienced during operation.

B. Method. Two groups of personnel were used: (1) Six radio operators unfamiliar with the AN/PRC-1184(XE-1) and (2) six truck drivers from the Fort Huachuca Motor Pool. The only prior instruction given any of them was the information that the ON-OFF switch was used to turn the sets on and off and that the CHANNEL SELECTOR SWITCH was used to select channels. They were then directed, in groups of two, to place the headbands around their respective heads and to attempt to communicate with each other through use of the sets at a range of 2,000 feet. The time required to achieve effective skill in operation was

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recorded, as well as significant events in the course of the learning period. (This portion of test was also used to collect range data on the equipment.)

An informal, but highly important, test situation was created when four field-grade Signal Corps officers and eight Civil Service employees assigned to the task (all with extensive technical education, training, and experience) attempted to acquire skill in the use of the AN/PRC-1184(XE-1).

Records were kept of the down-time of the equipment and of the length of time it required maintenance personnel to repair the equipment.

Fatigue experienced by operators, as manifested by lowered efficiency; adverse comments, et cetera, was recorded as it occurred.

C. Results. There was no significant difference between the learning period of the radio operators and the truck drivers and they may be spoken of as a single group (Table III). It took an average of one-half hour for these troops to become acceptably skilled in operation of the AN/PRC-1184(XE-1) as a receiver. Supplemental tests indicate that operation of the set as a transmitter required no experience whatsoever.

Eleven of the troops expressed an emphatic interest in use of the sets and were vocal in their enjoyment of operation. No fatigue attributable to use of the equipment was noticed even after eight hours of continuous operation. The exception to this pattern was a truck driver who, after about five minutes of equipment operation, ripped off the headband and fled the test site. This man is still classified as AWOL eight months subsequent to his disappearance. It was later learned that this man was a member of an extremely orthodox religious sect and expressed the opinion, as he was packing his suitcase, that the sets were "instruments of the Devil" and were to be shunned by the God-fearing.

The officers and Civil Service engineering personnel who attempted use of the sets were not as successful in acquiring skill as were the less-educated troops. Headaches and upset stomachs were encountered by eight of the twelve to the extent that the training had to be halted. Two more gave evidence of increasing emotional instability and were unable to continue because their hospitalization was required. One other (a Civil Service employee) resigned within several days and subsequently has opened a "Subud" center in a local town. (Research indicates that "Subud" is an obscure Oriental mystic religion suspected of being a Communist-front organization and the man is now under surveillance by the proper authorities.) The remaining Civil Service engineer expressed enthusiasm for the operation and principle of the AN/PRC-1184(XE-1) and became skilled in its use. This case is not considered significant, however, because (1) the engineer in question was only 23 years of age and had been a government employee for less than a year and (2) was known to

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be addicted to the reading of science fiction. He is no longer a government employee.

It was impossible to determine ease of maintenance of the equipment because no maintenance was required during the time the sets were at USAEPG.

Preliminary results of this test brought about a request of test discontinuance by the Test Group Leader. The request was disallowed by the former USAEPG Technical Director. This was considered an erroneous decision by the Communications Department Director and the appropriate investigating agencies were so informed. Testing continued until the present Technical Director was assigned three months later by direct order of the Army Chief of Staff. The remainder of tests were immediately cancelled. (See Appendix D for the other twelve plans of test.)

CONCLUSIONS

1. The apparent effective range of Radio Set AN/PRC-1184 (XE-1) is the result of test miscalculation. This conclusion is based on the scientific fact that microwave radiation does not possess the propagation characteristics necessary to permit the apparent range of operation.

2. The ostensible transmission and reception of messages did not, in fact, take place. The alleged duplication of transmitted messages by the receiving operators actually was the result of shrewd guesswork on their part and represents one of those rare occasions when the laws of probability and statistical analysis are not applicable. This conclusion is based on the known fact that the state of the art in neurology does not permit information inputs to, or outputs from, the human brain. (See Surgeon General's report, Appendix E.)

3. The equipment is the result of a monstrous farce perpetrated by the PsiCo Electronic Development Laboratories and actually is incapable of any type operation whatsoever. This conclusion is based on results of a complete dismantling of the two sets (including the sealed units) at the termination of test. It was found that the ON-OFF switches in both units were "gutted"; that is, they had no internal parts and no capability of conducting battery power to other portions of the equipment regardless of switch position. In addition, it was found that the circuitry within the transmit-receive sealed unit was nothing more than a complex and unintelligible circuit schematic printed with non-conducting ink and wrapped around a small piece of unidentifiable animal tissue encased in plastic. (Moreover, the schematic was bordered on all sides by several lines of undeciphered script—probably Hindic—that indicates manufacture outside the United States.) Further substantiation of the conclusion is supplied by our discovery that the third Field Representative sent by the manufacturer was not even educated in electronics but rather was

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a clinical psychologist. (Later investigation disclosed that this man had spent considerable time studying in India and Tibet and may well be, consequently, the agent of a foreign government.)

4. Adoption of this equipment by the U. S. Armed Forces would cause gross economic distress in those areas dependent on firms engaged in the production of military communications equipment, due to the fact that the AN/PRC-1184(XE-1) could replace all other forms of voice communications equipment and could be produced at a cost to government of only twelve dollars each in lots over twenty-five. This attack on our economic structure would constitute aid and comfort to the enemy and would weaken our defensive posture.

5. Availability of this equipment to an enemy or potential enemy would have disastrous effects on U. S. security and military supremacy, since it would supply the enemy with a secure means of communication unsusceptible to detection or jamming.

6. Use of this equipment by any but Federal law enforcement agencies would constitute an invasion of privacy and would be unconstitutional. This conclusion is based on the fact that all nonvocalized thoughts are transmittible by the equipment. (This conclusion also is presented in a separate SECRET report, FBI/CID-64-4-90087.)

7. Use of this equipment by unauthorized and unscrupulous individuals would lead to a rapid decay of the moral fabric of our nation and would constitute aid and comfort to the enemy.

8. The equipment can be used only by less-educated and less-intelligent individuals and produces dangerous psychologic and physiological effects in more-educated and more intelligent individuals. This precludes its tactical or strategic use by just those individuals most critical of our nation's defense.

9. Acceptance of these sets for test was an error in the first place and was compounded by the premature assignment of an AN number.

RECOMMENDATIONS

1. That Radio Set AN/PRC-1184(XE-1) receive no further consideration or test by the United States Armed Forces or their contractors.

2. That the party or parties responsible for acceptance of this equipment for test, and for assignment of an AN number, be investigated to determine their ability to function in positions of such responsibility.

3. That the premises of the PsiCo Electronic Development Laboratories, Salem, Massachusetts, immediately be secured by appropriate Federal law enforcement agencies and that all employees, executives, and owners be thoroughly probed by Federal investigative agencies and by representatives from the Office of the Surgeon General.

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Any process which you can define accurately, a machine can do. And that includes "How to replace a story-writing device . . ." **BY CHRISTOPHER ANVIL**

Howard Nelson shook hands with the white-haired man who stood behind the desk. "Nelson," said Howard, introducing himself, "of Nelson and Rand, Publishers."

"I'm Forrick," said the white-haired man, smiling. "Well, we of United Computers seldom meet a publisher. We're usually called in to straighten out production difficulties."

"That's my trouble exactly," said Howard.

"Really? You said you were a *publisher?*"

"That is correct. Publishers publish books, and books have to be produced. Let me assure you, we have production difficulties. But my specific problem at the moment is our monthly, *Varlet.*"

Forrick smoothed his white hair with one hand. "Oh yes," he said, smiling. "*Varlet.* I bought a copy the other night on my way to the train and rode three stops past my station. Very fine magazine." He cleared his throat, and blushed slightly.

"I'm glad you've read it, " said Howard. "You can understand it's hard to obtain material that's just right for *Varlet.* What we like is a humorous, sophisticated, but high-powered approach to sex."

"Fine art work, too," said Forrick approvingly. "But I don't see where we can help you."

"Didn't I read somewhere recently that you folks claimed

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you could make a machine that would play chess?"

"Why, yes, and we could. But there's been no demand for that sort of computer." Forrick frowned in puzzlement. "What does that have to do with your magazine?"

"Let me tell you some of the difficulties we have in producing *Varlet*," said Howard, "and you'll see what I'm driving at."

"Go right ahead," said Forrick. "I'm interested."

"To start with," said Howard, "our need is for a very specialized type of material, and writers only occasionally hit on exactly the right blend for us. This made it hard enough when we first came out, but we managed by using the best original material we could obtain, and by reprinting other stories and articles that happened to meet our requirements. But now"—he spread his hands—"there's not only *Varlet* on the stands, but also *Rascal, Sly, Villain,* and I understand there's one coming out next month called *Devilish.* How are we supposed to compete with that field when there isn't enough to be bought in the first place? It's impossible."

"I see your point," said Forrick, frowning. "You'd have to lower your standards. But *that* would hurt sales."

Howard nodded and sat back.

"It *is* a production problem," said Forrick thoughtfully. "Hm-m-m" He reached for a telephone. Soon he had a phone in each hand. "Meigs," he roared at one point, "that's our motto! If the job is impossible, we'll do it anyhow!"

Howard sat tight. Eventually Forrick put down the phones and mopped his brow with a large handkerchief.

"We've got the boys working on it," he said. "I'm glad you brought this to us, Nelson. It looks like a real challenge."

They shook hands.

Howard was cursing dismally over a piece of miserable art work some months later when they brought it in. He watched in amazement as the workmen set the glittering machine by his door, then he got up excitedly. The thing looked like a combination electron microscope and spin-drier, but plainly on the front of it in shining chromium was the word: Writivac-112. He walked over to look at it.

"Say, not bad," he said.

The technicians plugged it in and carried out tests with little meters and lengths of cord. Howard watched interestedly.

There was a discreet cough at his elbow. He glanced around. "If you'll just sign here, sir."

"How much?"

"Total cost, installed, is $5,750. Is that satisfactory?"

"Is it satisfactory?" Howard stared at him for a moment. To be able to just set dials and get exactly what he wanted? "Is it satisfactory?" He grabbed his pen, read rapidly, and signed his name.

As soon as they cleared out, he approached the Writivac-112. A little instruction book dangled beside it. "Fred! Don!" he yelled. "Get in here!" He got his two top men into the room, and then they locked all the doors and went to work.

The machine had several dials and settings. According to the little instruction book, the three knobs lettered A through C on the front determined the proportion of sex, adventure, and mystery in the story. The fourth knob, lettered D, handled special types, all the data for which had to be put in a feed-in slot at the top of the machine, and the feed-in switch thrown to the right. If a large amount of such special material had to be fed in, both memory and feed-in switches were turned to the right. Then the length and spacing switches were to be set, the On button pushed, and the user must be sure the ink reservoir was full and the paper dispenser loaded.

"Oh, boy," said Fred, who was art editor. "Check the paper reservoir, chief." Surreptitiously he turned dial A (sex), all the way to the right.

"I notice there's no humor dial," said Don coldly, looking over Fred's shoulder. As fiction editor and part-time writer, he did not look on the machine with enthusiasm. "It'll be a hell of a note if this thing doesn't turn out humor," he said. "I hope we haven't got a white elephant here."

"One way to find out," said Howard. He opened the cabinet in back. "Plenty of paper and ink there."

"Let's go," said Fred. "Can I push the button?"

"I'll push it," said Howard. He glanced at the settings. "A little one-sided, but let's see what happpens." He pushed the On button.

There was a soft, continuous, muffled clacking sound, and a faint sliding noise of sheets of paper slipping over one another. At one point the Writivac hesitated and then went on, just like an author hunting for the right word.

"Sounds O.K.," said Fred eagerly.

"Maybe it'll hatch an egg," grumbled Don.

"I don't like your attitude," said Howard, thinking of the $5,750 he had tied up in this.

"Sorry," said Don.

The machine whirred on.

At length there was silence. Then there was a loud plop, and a massive stack of papers dropped into view through the Out slot. A bell rang once, like the timer on a stove.

Fred and Don and Howard looked at each other.

Howard recovered first and reached in the slot.

Fred coughed. "Should we say some historic words?"

"I can't think of any," said Howard.

"Wait till later," said Don ironically, "and we can have the machine run some up for us."

Howard glared at him suspiciously, then pulled out the paper. The first sheet was a title page. In the exact center of the white sheet, capital letters spelled:

LUST

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They huddled around the stack of paper at a large table, and Howard cautiously removed the title sheet to glance at the first page. Immediately his face reddened. Fred's eyes bulged out like onions. Don pursed his lips and made as if to blow live steam out of his mouth.

After a lengthy silence interrupted only by the turning of pages, Don reached out a shaky hand to the carafe and poured himself a glass of water. Howard grabbed it. Fred quietly appropriated the rest of the manuscript.

"*Whew!*" said Howard. "I feel scorched."

Across the room, the machine rang its bell.

"What did you set the length for?" asked Don.

"I forgot to set the length," said Howard. He leaned forward and squinted.

"You've got a novel coming up," said Don, staring at the machine. "But we still don't know if the thing will write stuff for *Varlet*."

"Boy!" said Fred, looking up. "Where's the rest of it?"

"There's another ten thousand words or so in the Out slot," said Howard.

Fred shot across the room, and wandered back, reading as he walked.

Howard glared. "Don't hog it!" he roared. "Over here with it!" The three of them hunched over the new set of sheets as the machine clacked busily across the room.

The sun was a faint glimmer in the west as they finished the last page. Howard cleared his dry throat, and squeezed a last drop of water from the carafe. He glanced at Don. "What do you think?"

"My eyes feel like sandpaper just from reading it."

"How about it," said Fred. He made motions with his hands in the air. "A half-dressed babe on the cover, her negligee down over one shoulder. LUST in big red letters behind her. Nothing else. No background. No nothing. Just a plain cover with the babe and LUST. How about it?"

"It'll be banned in Boston," said Don dubiously.

"So what?" said Fred. "That's good advertising."

"We'll have to sell it under the counter," said Don. "We'll have to ship it out in lead-lined trucks and have it hustled over the state line by men in asbestos suits."

"Oh, it's not that bad," said Howard. "We'll say it's frank and outspoken, a down-to-earth novel. Could we call it a 'psychological study'?"

"I doubt it," said Don.

Fred shook his head reluctantly.

"All right," said Howard, "then it's a down-to-earth, plain-spoken novel about the stuff life's made of. We'll say it's a first novel, a masterpiece by . . . ah . . . by the new Boccaccio!" He looked up in triumph. "That's exactly the note to strike. Boccaccio's respectable. We'll say this is the work of a modern Boccaccio, that's all."

Don eyed the machine sourly and said nothing.

"Well," said Howard, "we'll rush it through the presses and publish it in the fall. Can you have that cover ready, Fred?"

"You bet," said Fred, grinning and raising his thumb and forefinger.

"I thought we got this thing to write stories for *Varlet*," said Don.

"Precisely," said Howard, "but we have to have enough breadth of vision to fit it into the big picture, too."

"A stroke of genius, chief," said Fred on cue.

"Thank you, Fred." Howard looked at Don hopefully.

"There's bound to be a catch in a thing like this," said Don.

Howard looked hurt. "Did any of your writers ever produce a book like that . . . or any kind of a book, for that matter . . . right on order in an afternoon?"

"No," said Don.

"All right. Now don't worry about *Varlet*. We'll set it up for *Varlet* next."

Fred sneaked a glance at his watch. "That book gave me an appetite," he said. "Why not let Don go out for some food?"

"I'm not leaving this room," said Don. "If anyone isn't needed here, it's the art editor."

Howard said mildly, "You can both go. It'll take two of you to bring it back." He pulled over a pad and scribbled his order. "Here, and don't lose the paper."

After they had left, Howard made careful adjustments on the Writivac. He fed in several exceptionally good issues of *Varlet*, three of *Playboy*, two copies of *The New Yorker*, and an old issue of *Esquire*. He replenished the paper supply, checked the level of the ink, and set the length for two thousand words. Then there was a commotion at the door, and he looked up to see Don and Fred come in with covered trays.

"Well, we eat in style," he said. "You were fast enough."

"We naturally wanted to get back in time to see our next issue," said Don.

"You set it up yet?" asked Fred.

"Just finished." Howard pressed the button.

They had hardly uncovered the tray when the Writivac-112 rang its bell. Fred started eagerly across the room.

"Wait a minute, will you?" said Don. "Once we start reading that stuff we'll never get to eat."

Howard started buttering a roll. "Come on back, Fred. It can wait a minute."

Fred came back reluctantly. The minute they finished the food and piled the trays to one side, Fred was across the room again. The three of them crowded over the printed sheets. On the title page appeared the words:

THE PARK IN SPRINGTIME

"Could be anything," said Don.

"It sounds promising to me," said Howard.

They leafed through the sheets with intense interest, three pairs of eyes moving as one.

When they were through, Howard looked up exultantly. "We're in!"

Fred looked dazed. "Boy," he said at last. "Boy!"

Don nodded reluctantly. "It's good," he said.

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They clapped each other on the back, Fred and Howard happily, and Don resignedly. Mentally, Don was filling out a correspondence school coupon for a course in welding. Finally they all went home and fell into an exhausted sleep.

The next six months, for Howard, were a triumphal march. *Varlet* was coming out twice a month, and arrangements were being completed to bring it out as a weekly. The magazine had so much advertising that it was as thick as a phone book, and desperate TV executives were petitioning Congress to pass a law against it. Just in case, Howard was planning a home-type magazine. He and Fred were making final arrangements on the format of *The Saturday Reader's Companion.*

Don, still attached to the office in a roving capacity, was out at the moment getting some dinner for Howard and Fred, who were going over final plans for the *Reader's Companion.*

"We won't get many ads at first, of course," Howard was saying, "but after the first couple of issues—" He was interrupted by someone rapping the outside of the door with his foot. "There's Don with the food." He started to get up.

"I'll get it," said Fred, springing to his feet.

Don came in carrying a stacked tray balanced on a pile of magazines. He was grinning like an imbecile.

"You out of your head, boy?" said Fred. "Watch that tray!"

Howard scowled. "What are all those magazines? What are you bringing them in here for?"

Don shrugged. "I told you a thing like that had to have a catch in it." He plopped down the stack of magazines.

"*Varlet,*" he said. He tossed a copy onto the desk. "*Devilish.*" He tossed a copy of *Devilish* onto the desk. "*Sly.*" He tossed a copy of it on the desk. "*Villain.*" Another copy. "*Slicker.*" Another. "*Hellion, Rascal, Knave, Cheat.*" He tossed them on the desk in rapid succession.

"Open any one," said Don. "Look at the stories. Good stuff."

Howard blinked.

Fred closed the door furtively and locked it. "What are you getting at?" he asked. "We've still got the *Reader's Companion* coming out."

"I think *I* get it," said Howard slowly. "What's that last thing you've got in your hands there?"

Don held it out for him to see. "The *Publishers Gazette.*" He opened it to an ad on an inside page.

Howard took it and read:

"Writivac-120, the new all-purpose electronic writer, composes stories typed, double or single-spaced, adjustable margins. Neat copy. Choose one of several styles. Mystery Master, at $3650, is a sound low-priced machine. Can be converted to any other standard type by inserting pop-in coils (available at extra cost). Genre King, at $5750, supplies the best in versatile production-ability with complete control over content. Flexible. Swift. Reliable. Get yours today.

"Available with pica or elite type. Prices slightly higher west of the Mississippi."

"Well—" said Howard.

"I knew there was something fishy," said Don. "What they did was give us a pilot model and watch to see if we complained of quirks while they got their production lines tooled up. Now they're in mass-production. If they get the price down far enough, or the payments spaced out long enough, there'll be one in every living room in the country. We've had it."

Fred stared at the floor.

Howard cleared his throat. "How's that welding course coming?" he asked hopefully. "Is there room for two more in the class?" ■

in times to come

The lead yarn for next month will be "The Mailman Cometh" by Rick Raphael. Raphael has looked into the problems of the highway police of the end of this century; this time he takes a look at the Post Office department—on a galactic scale.

And the trouble with galactic-scale enterprises is that there's an inevitable tendency to overlook the fact that human individuals necessarily occupy the niches in the Great Machine. And, as Raphael demonstrates, it can be astonishing to the High Brass to discover the extent to which even a little peanut butter and jelly can gum up a far-flung enterprise.

The Science Faction, complementing our Fiction, will be an article on Lunar Mission Spacecraft, by Joe Poyer, who has a little something to do with that interesting business. The Best Laid Plans department is, of course, certainly going to work over the present plans—but it is worth having, for the record, the plans as of the end of 1964. (The effect on U.S. plans of the Russian three-men-in-a-tub exploit is not yet known, of course.)

But . . . For Your Information, this article will give the present U.S. thinking on the problem of reaching the Moon.

THE EDITOR

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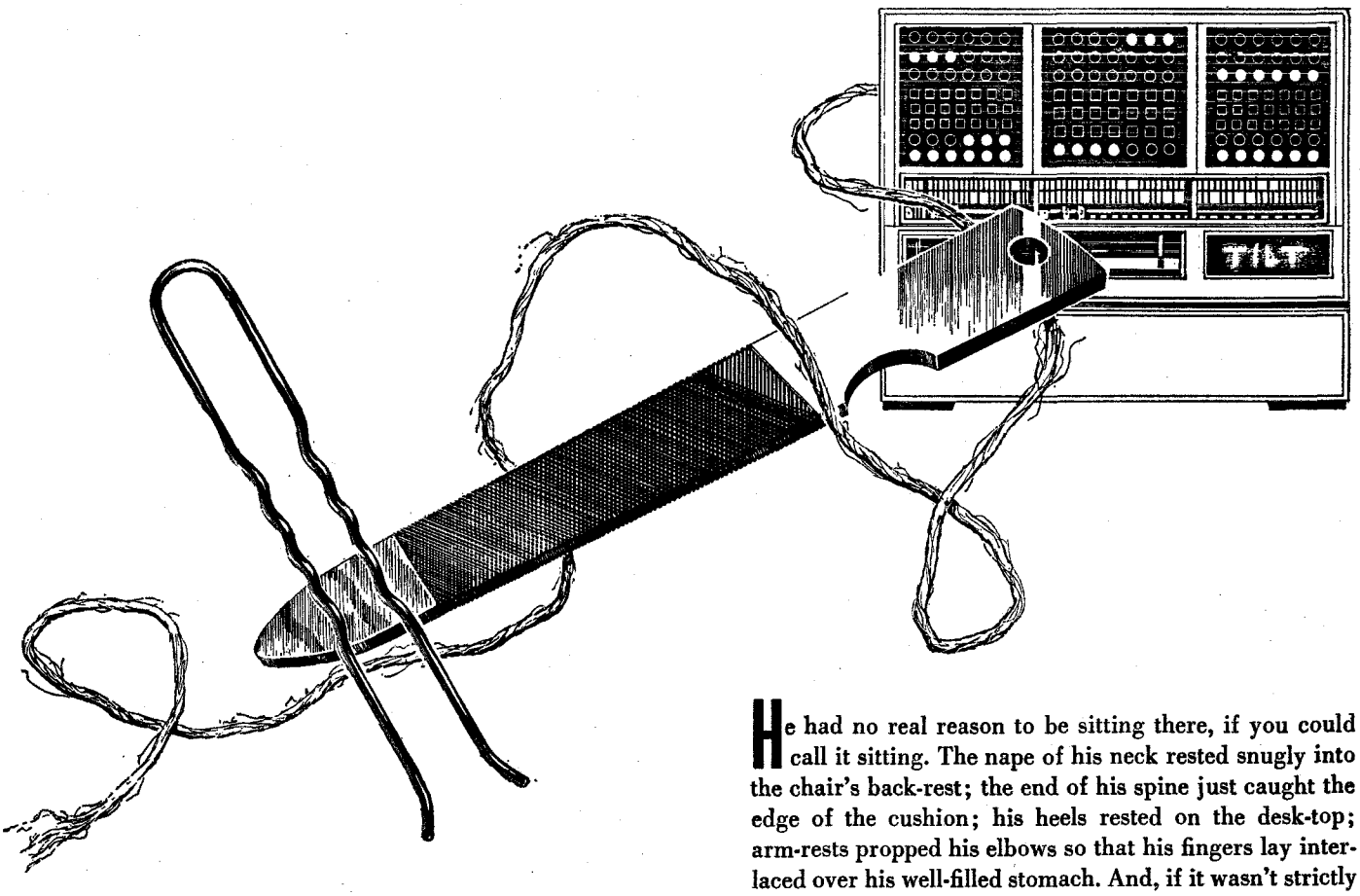
JOHN T. PHILLIFENT

FINNEGAN'S KNACK

A perfectly logical, and highly educated man can't possibly be impressed by any logical system. But there are people who really aren't logical...

Illustrated by Kelly Freas



He had no real reason to be sitting there, if you could call it sitting. The nape of his neck rested snugly into the chair's back-rest; the end of his spine just caught the edge of the cushion; his heels rested on the desk-top; arm-rests propped his elbows so that his fingers lay interlaced over his well-filled stomach. And, if it wasn't strictly sitting, it was comfortable. Major Jack Lawrence appreciated the comfort. Through the window in front of him he saw nothing but peace, sun-drenched and still. A quiet stretch of concrete, a fence, and then bushes and a steady upward slope away to the gentle green of hills. An inviting prospect.

He contemplated it, with just a niggle of unease. By rights he should have been out of this office long ago, in his staff car, and away up into those hills. But he had a hunch, and Major Lawrence had spent most of his life paying wary respect to hunches. This quirk, this fondness for the promptings of intuition, was probably the

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reason why he was still only a major, at his age, and content to be the C.O. of Camp Laurel, which was little more than an oversized motor pool halfway to nowhere. Not that he worried about it. Nor did he worry that the whole concept of "military" had been allowed to fade into discreet semiobscurity in recent years. Not a pushful man, he had a sneaking fondness for the backwater life. What did worry him was the nature of the hunch itself.

Hunches could be the very devil, sometimes. You could never be sure whether they were genuine flashes from somewhere else, or just the disguised promptings of the subconscious. This one, now, was so vague as to be meaningless. He tried running it through as an interior monologue.

"Lunch is over. This is Saturday. There is absolutely nothing here that needs my tender care. In fact, Captain Stevens can run things better without me. Up there"—he lifted his gaze to the distant hills—"is a cabin, is solitude, is a lake where the fish have been having it all their own way for a whole week. I ought to be there. Instead, I am here. Why? Just because I have this feeling that something odd is about to happen. Is that a good, sane reason? It is not. Hell, if something out of line does break, Steve would probably deal with it in my absence and say nothing about it until I got back. So what am I waiting for?" The monologue ran out without yielding any satisfactory answer. He sighed, and his desk intercom buzzed. He reached a long arm and a finger to the "sound only" button.

"What?"

"I have a call for you, major, sir."

Lawrence sat up, convulsively, and glared at the enigmatic box.

"That is Private Finnegan's voice, or I'm crazy. Maybe I am. What are you doing on the switchboard?"

"Just filling in, sir. The duty-man had to take five, urgently."

Lawrence sighed, and decided to brush aside the minor matter that the intercom system was especially so designed that he could not be raised other than through Captain Stevens' office. Little impossibilities like that had never been known to bother Finnegan.

"All right," he said. "Let's have it. Who wants what?"

"It's a Colonel Scorth, sir, calling from Camp Wilby—"

"Scorth! Put him on, full channel. I'll handle it." Lawrence sat a little more erect now, and stifled a wry grin. Some hunch! A long, lean, lugubrious face grew into clarity on the screen as he touched the vision button. He knew that face almost as well as he knew his own, knew it to be the same age as his own, but it had gained a heavy crop of responsibility-grooves in the seven or eight years since he had last seen it.

"Colonel Scorth," he said, very formally, just in case. A lot could happen in seven years. "This is Major Lawrence, Camp Laurel. What can I do for you?"

The gloomy face split suddenly into a grin. "Jack Lawrence! Good to see you. They told me you were still at Laurel, and I didn't want to believe it. Don't tell me you haven't moved in all this time?"

"Oh, I've been around a little. You can't win them all. But I managed to finagle my way back here, as C.O., yet, about a year ago. Just let them try and move me, now! But what are you doing at Wilby? You're no Field Weapons expert, surely?"

"No. Just pulling rank. This is as close as I could get without being obvious. Couldn't very well post myself to a Transport Base, could I? Jack, I'm looking for some place to hide, somewhere I can think in peace. Do you still have that cabin, and that lake, and the fish?"

Lawrence made a fast and rueful decision, cloaking it with humor. "By the look, your need is greater than mine. It's there, and vacant. Help yourself."

"You don't change much," Scorth retorted, "and I can still read faces and voices. I don't want to foul up your week-end plans."

"I have all the week-ends there are, Ben. I won't miss one. I'll have somebody bring the cabin keys over."

"No, hold it. Jack, let's do this thing right. Make it look all official and aboveboard, just in case there's anybody watching. I'm requesting from you one staff car, adequate provision, one driver, and one senior aide—that's you. You will, with reasonable haste, pick me up at Wilby and then proceed to a private destination, there to confer with me on matters of great importance. That's for the book. Strictly between us, I have the whole world on my back, and if I don't unload it on somebody, soon, I shall start eating my fingers. As I recall, you always were a good listener."

Lawrence held his face straight. "How long d'you want to hide out for? A week? A month?"

"It's nothing like that!" Scorth grinned despite himself. "I'm no crook. Lord, if only it were that simple! I'll tell you when I see you. When will that be?"

"An hour, maybe less. I have my car standing by, anyway. All I have to do is scare up a driver. See you."

He broke the connection, got the switchboard again, and Finnegan. "You still there? Be outside my office, with my car, in five minutes."

"Sir!" Finnegan's voice was shrill. "You want *me* to drive you?"

"Only because there isn't anybody else available on the post. You be there!"

He switched off, and squandered a precious moment wondering what it could be that had put that "end-of-the-world" look on Ben Scorth's face. Thinking back to younger, livelier days, he recalled that Scorth had been keen on the psycho-social and propaganda aspects of the military machine, whereas he, Lawrence, had always been more at home with matters mechanical and mobile. "Better *get* mobile, too!" he nudged himself, and went out of his office at a brisk trot.

Outside, Captain Stevens was just settling behind his

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desk and made shift to rise again, but Lawrence patted him down with a gesture. "Hold the fort, Steve," he said. "Forget you ever saw me, or that you have any idea where I'm going. Nothing short of a national disaster is big enough to jog your memory, either. All right?" He went out, into the hot afternoon sunshine, to where Private Finnegan waited, with the car.

"Camp Wilby," he said, with great earnestness, "is a little over two miles straight along the road from here. Turn left out at the gate and just keep going. Even *you* cant' miss that. Or am I being optimistic, again?"

"Yes, sir—no, sir—right away, sir!" Finnegan frowned horribly, then turned to look back over the seat. "What was that again, sir?"

"Never mind. Just get going. I'll tell you when to stop."

The great trouble with "wild" factors is that you can never be sure whether the sign is going to be positive or negative. Lawrence was not too surprised that they made Camp Wilby in just a third of the time he had estimated. Colonel Scorth commented on it as he scrambled in, lugging a fat brief case.

"That was a damned short hour, Jack."

"Let's be thankful it wasn't as far out the other way. It could have been. All right, Finnegan, about face, and pick up the second dirt road on your right. Hold up your right hand, with two fingers. That's fine. Stick with that and we'll be all right."

The car lifted and began to skim along the quiet road. Scorth chuckled as he leaned back. "I see you have one of the stupid ones. Amazing how there's always at least one in every outfit."

"I wouldn't call Finnegan stupid," Lawrence disagreed. "He's just not very predictable, that's all. Given half a chance, he's liable to go off at a wild tangent. But never mind him. What's on your mind? By the look, you weren't kidding when you said you had the whole world on your back."

Scorth shook his head, cuddled the fat brief case, and sighed. "I'll ask you a funny question, Jack. Trouble is, to the best of my knowledge, there's no funny answer. No answer of any kind. How would you feel if you had reason to believe that the human race is on a Neanderthaloid level compared with the rest of the galaxy?"

"That's not a question," Lawrence grunted. "That's a hell of a lot of big assumptions wrapped up in far too few words, and a shocking thing to pull out of the blue and toss in a man's lap on a fine Saturday afternoon. What rest of what galaxy? So far as I know, we have a Lunar Colony beginning to thrive, a couple of small bases on Mars, and a scrambling toe hold on Venus. We have some kind of project for a Star-Jump—some new drive-principle or other—I believe. I'm not too up-to-date, I know. But 'the rest of the galaxy' is just too big to take in. Don't tell me we are worrying, this far ahead of time, about what we might find out there?"

"Just answer the question as it stands," Scorth suggested. "Assume the galaxy is inhabited, federated and rational, and that we are showing all the signs of being a sub-sub-primitive culture. How would you feel?"

"Well, now," Lawrence leaned back, "there are two answers to that. For me, personally, I wouldn't give a damn. But you know me, Ben. I've never been the competitive type. I'm a member of the human race, sure, but I've never seen it as a race in the other sense, something to be won. For me, living is something I do, my way, not try to do better than some other guy. On a general basis, though, I can see where it would come as something of a slap in the ego. As for the effects if it was true, that's more your field. Or was—?"

"Still is. The consequences would be disastrous. Will be. Call it species-conceit. Man has always been quick to see himself as the top, the ultimate, the cream. Created in God's image, if he's the religious type. The latest and best fruit on the evolutionary tree, if he's more inclined to the scientific. But the best, whichever way you put it. King of the castle. Lord of all he surveys. Top of the pyramid. There are a hundred similar images. Let him once discover that his kinghood is no more than the tribal Old Man, and his pyramid a mud heap, and Lord only knows what the consequences will be."

Lawrence mused, frowning at the passing panorama without seeing it. The car surged and swooped, following the rough trail.

"I don't get the point of the exercise," he confessed. "Are you maybe trying to work up some propaganda argument to kill the Star-ship Project before it gets off the ground?"

"That's a strong possibility, yes."

"It won't work," Lawrence snorted. "Since when has intelligent humanity run away from a purely hypothetical hazard? You've got too many 'ifs' in there to make it work. After all, we don't know, not for sure, whether there's any life or intelligence out there at all, much less how smart—" He broke off as Scorth smiled, completely without humor.

"That," he said, "is the point, Jack. We *do* know. Only a few of us, as yet, but we know. The question is exactly as I stated it. The cultures out there have finally called in on our primitive little Sol-system island."

"Hah?"

"All very nice and friendly. But critical. Not patronizing, exactly, but something very like it—" Scorth broke off, suddenly, and sat up. "Is this some modified model car, Jack? What I mean—I've never seen a cushion-car ride high by the nose the way this one does."

"I was hoping you hadn't noticed." Lawrence craned forward over the seat back to mutter in Finnegan's ear. "What's wrong with the car? Why are we canted up in front?"

"This is a rugged old track, major, sir!" Finnegan said, very seriously. "I figured we'd ride the bumps a lot easier if we had our nose up."

Lawrence had long ago learned to pause and think be-

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fore commenting on such oddities. He did so now. And Finnegan was quite right. The car was breasting the root humps and pot holes much more smoothly than he remembered from previous trips.

"All right," he shrugged and sat back. "Just a trick, Ben," he said. "It takes the worst of the kinks out of the road."

Colonel Scorth accepted the explanation without further thought, being too engrossed in recalling the peaceful scene as the car slid through a cleft in the rock walls and came out into a glade where the sky was repeated in the still waters of the lake, and the cabin waited for them. It was for Major Lawrence to tuck away in his mind, alongside several similar items, the hard knowledge that a cushion-car, any cushion-car, rode on a trapped air bubble. It could not be made, deliberately, to cant in any preferred way. It didn't have that kind of controls. But this one *did* have Private Finnegan. He let the enigma go and engrossed himself in the business of opening up and unloading. Peace was almost a tangible thing, here. Blue sky, blue water, guardian hills all around and a cool breeze to fill the nostrils with pine scents—one could almost feel the tensions snapping and peeling off.

Colonel Scorth scratched a match with care, got his pipe going, and leaned his back comfortably against a tree bole. The heel of the rod under his foot was propped against a handy root and stood out at an angle over the still water, the float bobbing idly in the ripples. Lawrence, watching him, thought it was safe, now, to break the companionable silence.

"Would you mind letting me have it all over again," he asked. "But deal from the top, this time, Ben. All right I'm in a backwater, here, but I do keep abreast of the news, and I never heard about any Galactic invasion. How come they could keep a thing as big as that a secret? And why? And where do you come in on it?"

"Take the last first." Scorth blew out a pool of blue smoke, watched it disperse. "I'm in psychological warfare. You might say I *am* it, for all the good it does. And I came in, was called in, when all else had failed. You don't need me to tell you how the military image has lost prestige in the past two decades, what with international co-operative efforts, scientific and ecological projects, new nations itching to grab their share of global prosperity—planetary colonies—multi-racial co-existence—let's all pull together, don't anybody rock the boat—it's one world and we all have to live on it—you know how it is. The very word 'war' is almost an indecency, and a military organization is something to be pushed discreetly under the rug and forgotten."

"I know," Lawrence nodded, "and by me, it's fine. Peace, it's a wonderful thing!"

"Agreed. I'd be the last to want to go back to the old ways. But—" Scorth sighed and shook his head. "I'm no psychological expert, Jack. I'm administrative. Or executive. Not technical. I know a trick or two, and most of the basics, of course. But my job, strictly, is to put the right man or the right group, in the right place at the right time. And I just do not have them any more. My skilled staff has dwindled along with the prestige. They've faded away into more prestigious and better paying fields, into industry, advertising, politics. All I have is a junior or two, and an office full of women." He shifted a fraction, to a more comfortable position.

"The real devil of it is—I don't even know that what I've got is a problem at all. I keep thinking of an old cartoon gag I saw once, in a textbook, of a psychiatrist telling his distressed patient 'The trouble with you is that you really are inferior.' It could be just like that."

"They must have laid it on strong, this invasion party—?"

"Not a party. Just one person, all by himself."

"A one-man invasion?" Lawrence snorted. "That doesn't sound very impressive, to me."

"It doesn't—didn't to us, until we thought about it." Scorth sucked on his pipe. "Somebody said, once—I forget who—make people think they are thinking, and you flatter them, but make them really think and they will hate your guts. The Examiner is getting to be, is going to be, the best-hated man on this planet, just by doing that. We call him the Examiner, or 'X' for short, which is stupid, because there's very little about him that is mysterious, or unknown, or threatening. I've chatted with him for hours. My brief case is crammed with transcripts of conversations, with all sorts of people. And they are all very friendly and cordial. It's the devil!"

Lawrence nodded, and waited patiently. He was a good listener. He could appreciate, vaguely, how it would be just that bit more infuriating to have to deal with a genial and pleasant opponent. You could at least get good and mad when the opposition was unpleasant, and it helped.

"Almost exactly a year ago," Scorth mused, aloud, "the Interplanetary Confederation, that bright and shining new idea, from its big new building in Geneva, announced its first major decision, to finalize the project to build a ship for the stars. Tenders invited from anyone and everyone who had anything to contribute. Offensive and defensive experts very, very low down on the priority list. And one of the first reply-signals received came on a tight beam from a far-out orbit, addressed to the I.C. Comptroller. In four languages, it was a request for permission to land, meet and discuss. It was absolutely deadpan, and claimed to originate from Agent 4/4/807 of the Galactic Confederation. Naturally, nobody believed it. The news agencies wouldn't touch it. It was left to some minor clerk with a sense of humor to send a reply and permission.

"In less than an hour a very strange craft set itself down in the harbor at Geneva. A man got out, securing the ship behind him. It is still there. I've seen it. It's a silvery gray ovoid about twenty feet by fifteen, and

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sublimely indifferent to anything our technological wizards can think up to try on it. So, too, was the man himself, at first."

"At first?"

"That's the first big point, Jack. If it took nerve to show himself all alone like that and seek an interview with the Comptroller, it took a hundred times as much to do what he did afterwards. I'm quoting from eyewitnesses, now, when I tell you that he invited tests to prove that he had a defensive shield, a body-screen that rendered him immune to anything we could throw. It was about there that the top people became alerted and alarmed, too, and the Security wraps came on, tight. Then, just as soon as everybody was satisfied he was telling the truth, he took off his gadget—a belt-harness—set it to 'safe', handed it over, and explained that he was now totally defenseless!"

"That wasn't nerve," Lawrence growled. "That was insanity."

"Oh, no. He knew exactly what he was doing, and he laid it on the line. 'Injure me,' he said, 'in any way, and you will be judged accordingly. By those who sent me.' Just like that."

Lawrence frowned, trying to picture the scene and grasp the implications. "An impressive-looking person?"

"Not in the least. You'd never see him, in a crowd. Study him as I've done and you'd get the idea that he's average. A high-average. And that is precisely why he was chosen . . . picked for the part."

"A one-man League of Nations, eh? They must really know us well out there, Ben."

"Out there?" Scorth murmured. "How d'you know there aren't thousands of them right here now, studying us?"

"What does he want, anyway?" Lawrence pushed the uncomfortable thought away hastily. "What? Unconditional surrender?"

"No—" Scorth rapped out his pipe and put his heel on the glow to kill it. "He has come to make us an offer, if we can qualify. That's why we call him the Examiner. If we can make the grade, we are offered membership in the Galactic Confederation."

"And if we don't make it?"

"Nothing!" Colonel Scorth got to his feet, collected his rod, began reeling in. "Nothing at all. They will sit back, keep clear, and let us go it alone."

Strolling back along the lake shore in the gloom, Lawrence pondered the point and was puzzled. "I don't get it. Assume we fail—as you've already implied—what's so terrible about going it on our own? Isn't that what we intended to do in the first place?"

"Think a bit more," Scorth advised. "Think! God knows, I've been telling myself to do just that ever since I got involved in this thing, so much so that the words begin to lose their meaning. But think, Jack—Hah! Your man might be a goof, but whatever he's cooking up sure smells good!" Lawrence had already picked up the scent and his mouth was watering.

"Just as well he didn't wait to cook our catch," he joked, and then the humor died, giving place to sea-green envy as he saw what Finnegan was tending, in the skillet. Sizzling, mouth-watering beauties, they were—a catch to puzzle a man whether to eat them or save them to brag about. One more item to file away, and to remind himself to pry the information out of Finnegan at the first diplomatic opportunity. Where—and how—had he taken those?

Full and comfortable, the two men sat on the cabin porch and watched the twilight paint the lake and hills into purple darkness.

"I've done my thinking," Lawrence announced. "I still don't see why we can't jump off into the wild blue yonder, alone. We've done it before. There have always been impatient pioneers. Not me, admitted. I'm not the type. But the breed hasn't died out, has it?"

"Not the breed, no. But circumstances aren't the same, Jack. The old pioneers went on foot, with what they could carry, and they didn't give a damn whether anybody followed or not. And we would never have got as far as the Moon, on that basis. Just our little planetary colonies, alone, are symbols of a fantastic investment in time, brains, money, and lives, most of it put up by people who will stay right here, and hope—gamble—on getting some sort of return, some time. The pioneers have gone. If and when the bases grow big enough to make it possible, the emigrants will follow, and then, maybe, the profits will begin to show.

"The same dynamic applies to the Star-Jump. The people who will go are pioneers, certainly, but those who are sending them and the ship, backing it, making it possible, are the hopeful emigrants, and the strictly business types, gambling on a return, a payoff of some kind. There's a hell of a lot of space out there, Jack, and all sorts of hazards we can only guess at. It's cost us plenty already, just to find our way around our own backyard. Star-Jump is several orders of magnitude more hazardous. So it is more attractive if we can count on some friendly co-operation, out there."

"You have a point," Lawrence admitted. "This Galactic Confederation—do we have to pay dues, or abide by rules and regulations—that kind of thing?"

"Nothing like that. It is strictly co-operative. A member culture puts in everything it has in the way of arts, skills, technological know-how. That goes into a common information pool. And you can take out whatever you want, or can use, and do what you like with it, short of physical threat or damage to any other culture."

"By golly!" Lawrence breathed. "I'd like to see their reference filing-system. They must have Information Retrieval off to a fine art."

"From what 'X' has told me, they have one whole planetary system devoted to just that."

"Look—" Lawrence began to feel irritated, "if this

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Examiner is such a free and easy person, what's the big snag about us qualifying? What sort of test do we have to pass? And who's to judge, him?"

Colonel Scorth sighed so deeply it was almost a groan. "That's the pay-off question, isn't it? And it's difficult. To explain, I mean. Even for 'X'. Particularly for him. Yes, he's the judge, and he has told us what the test is, as far as he can. Let's see if I can explain it to you. First off, let's get this much clear. 'X' is *not* human, not in the strict sense of the word. Nor is he a superman in any way. He was selected, and very thoroughly briefed, for this job. He's just one out of many. Other Examiners are groomed for other systems. He is—represents—an adult, high-average, highly intelligent, highly educated, human. Just that. It doesn't sound a lot, does it? And the test doesn't sound much, either, until you think it over. All we have to do—we humans—is to surprise and impress him. That's all. We have to show him, in other words, that we have something to contribute!"

Lawrence knotted his brow in baffled silence, trying the idea forwards, backwards, even sideways. "It doesn't make sense!" he complained. "It's too vague, too general to get a grip on. Impress—how? What sort of standards is he setting? What sort of surprise does he want?"

Scorth gave a wry grunt. "Don't think I haven't beaten my bit of brain to a pulp trying to answer the same questions. As I say, I came in late on this, after all the other self-styled experts had tried their hands. And failed. It has got to be something desperate, these days, when they call in the army. I've read their transcripts. I've met 'X' and talked with him. I like him. He's a very friendly affable, pleasant person. Anxious to help, almost. But—obviously—he can't tell me the answer, even if he wanted to. As I've already said, Jack—think! Can I tell you how to impress me? Can I tell you how to surprise me? Can I?"

"Hold on there!" Lawrence muttered. "I don't care how intelligent or well-educated your alien is, he can't know *all* the answers, surely."

"Now *you* hold on," Scorth retorted, "or you'll go down the same old path the rest of them followed. This is not a matter of data. 'X' gave me that point, when I asked him. An obvious question that none of the others had thought to ask. 'We judge a culture,' he said, 'not by its collection of facts, data, and familiarity with natural laws, because those are whole-universe items, there for anybody to discover. They can never be the sole property of any one group. Not by what you have. Or by what you are. But by what you do with what you've got.' That was very helpful of him. I feel that. But I'm damned if I can apply it."

A silence grew and thickened about the two men, to be broken, at last, by the sound of Finnegan's footsteps.

"Major Lawrence, sir. Do you specially want me to stay out here overnight, sir?" Lawrence caught the faint note of unease.

"Why, don't you like it out here, Finnegan?" he asked.

"I'd just as soon be back in camp, sir. This is fine in the daytime, sir, but I'd just as soon be back in camp, to sleep."

"All right," Lawrence stifled a grin. "I think we can fend for ourselves. See that you're back here bright and early in the morning, mind!"

"Yes, *sir*!" Finnegan went away, smartly.

Lawrence's grin held until he heard the car motors cough and purr into life. Then Scorth said:

"Not a pioneer, that. I feel like saying 'I wonder what the army's coming to?' only I already know the answer, and I don't like it."

"There's something else I don't like, too," Lawrence mumbled. "I'd been taking it for granted, all along, that Finnegan was the hillbilly sort. But if he's uneasy about sleeping out in the hills, that washes out. And that makes it even more baffling."

"What?" Scorth wondered.

"Oh, nothing much. Only, how the blazes did he manage to catch that mess of fish for supper, when we didn't get so much as a nibble?"

"That's a good question," Scorth grunted and got up. "But I have more important things on my mind. If it's all the same to you, Jack, I'm going to turn in. Maybe it's the air, or the peace and quiet, or the unburdening, or all three—but I feel I'm going to sleep sound tonight for the first time in months."

Stretched out, Lawrence could see across the dark of the cabin that Colonel Scorth's pipe bowl still glowed, fitfully. He ventured to ask: "What kind of things did the others try, to impress the Examiner?"

"Hindsight makes for easy wisdom," Scorth grunted, "but I've read the transcripts, and they are infuriating. All the wrong things first. The fools tried to dazzle him with technology, first, when a moment's thought would have told them that the people who built that ship, and that immunity-belt of his, are centuries ahead of us in technology. Then they began to think. They got a bit smarter, but not much. They tried him with the latest in research frontiers. Particle-physics, molecular chemistry, biology—the fools! But they kept at it. They discovered, as I've discovered, that real thinking is hard work. They dug up the wise men, the savants, the philosophers, the visionaries—the cream of Earth. Those transcripts are an education. 'X' has only to hear a few sentences, some basics, an axiom or two, and he can take it from there, forwards and backwards, in all directions, reach all the logical conclusions, point out the fallacies where they exist, and discuss the possible implications. Literature? Give him a chapter or two and he has all of it. Visual arts? He can grasp the symbolism, the basic motifs, the color-schemes and forces, almost at a glance. Show him a design and he can tell you its function, meaning, purpose, origin and potentials. He just reasons them out, quite literally.

"When I came in on it and discovered what had been

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done already, I threw the rule book away and tried him on comedy, satire, abstractionism, music, dance—sports—I might as well not have bothered. He is interested, often entertained, frequently amused, always genial—he's having a fine time. But, although he has never actually said so, he gives the impression that everything I show him is tremendously obvious and logical. As if any fool ought to be able to see it. Old hat! And the hell of it is—he's absolutely right. As fast as he sees it, so do I!"

Lawrence put his head back, in the dark, and wondered. Humanity shorn of its pride, shown to be simple primitives. A bitter pill. But did it have to be swallowed?

"Suppose," he hazarded, "we reject the test altogether? Suppose we tell him we're not interested in meeting somebody else's qualifications? Then what?"

"It's been thought of," Scorth sighed. "I asked him *that* one. The answer was simple—and wicked. Just as soon as we, the responsible ones, can assure him that we speak for and on behalf of a respectable majority of the human race—that we are not interested in becoming members of the Galactic Confederation—then he will depart at once, in peace, and forget all about us."

"Oh, brother!" Lawrence growled. "That's a hot one. Our Examiner is loaded with hookers, isn't he? The majority of humanity, hah! Spread the news and tip the fat right into the fire, no two ways about that. Ah well, goodnight, Ben. I'm sure glad this is your problem and not mine."

But then, as the sound of regular breathing told him that Scorth was asleep, he brought back that last statement for revision. It *was* his problem. It was humanity's problem, like it or not.

"Think!" he commanded himself. But the more he thought, the more he realized how tight the trap was. Thinking is something one does in certain ways, and along certain learned pattern-paths. It's a logical process. And what good does that do you, when you're up against somebody who can perform the same process a lot faster than you can? If only—he slid down the black velvet slope of sleep trying to formulate it—if only it were possible to think in nonlogical patterns.

The question was still fogging his mind the next morning as bright daylight struck through the cabin window and stirred his eyes open. He sat up cautiously so as not to disturb Colonel Scorth, and grinned at his own fancies. To think nonlogically was surely a contradiction in terms, if you defined thinking as a logical process. You might as well ask a man to look with his eyes shut! Then his grin faded as he heard the first far-off sounds of a speeding motor. Urgent but silent he climbed into enough clothing to fend off the morning crispness and went outside to waylay Finnegan. He was in time to see the car turn into the narrow track between the high banks, and stood watching as it came floating out into the open space beside the cabin.

Nodding an acknowledgment of Finnegan's salute, he thought up a diversion. "Colonel Scorth is still sleeping," he said. "Can you catch us breakfast to match last night's supper?"

"Yes, sir!" Finnegan grinned and went away round the corner of the cabin down to the lake shore. As soon as he was out of sight, Major Lawrence climbed into the car, into the driver's seat, and sat.

"Now!" he said, with determination. "I saw this with my own eyes. I *ought* to be able to figure out just how he manages to make this thing ride with its nose up in the air." He stared at the controls as if they were new to him, defying them to baffle him. But they weren't new, at all, and the very familiarity of them was depressing, in itself. Long years of engineering theory and practice helped him not at all. He was reduced to the primitive hopelessness of touching everything, fingering and tugging and shaking his head. Then, completely by chance, he saw something, and fastened on it. His hands were on the tiller-levers, and, as any driver will when checking, he was craning his head round to watch the steering-vane movements which were produced by the lever-operations. Because his irritation had spilled over into anger, he was yanking back on both levers at once, a senseless thing to do, as the whole system was wire-locked into co-ordination.

But it wasn't, not quite. There was a certain amount of back-lash on the wire controls. More than there should have been, perhaps. He let that go, and studied the steering vanes critically, making experimental tugs with his hands. Pull back on the right-hand lever—the left lever came forward—the right-hand vanes swung outboard—you were steering right. Pull the left lever to turn left—all straight and sane. But pull back on both levers, as no rational driver would do, not one who knew anything at all about the principle involved—and the steering vanes tried to go both ways at once. Because there were six inches difference in the location sites of the control wires, and a certain amount of play on the bearings, those vanes twisted just a little out of line. The upper edges came slightly closer to each other, the lower edges gaped just that little bit apart.

Lawrence snorted, shook his head in disgust. So that was it! A pinch effect, due to mechanical tolerances. Enough to depress the rear end, though. The question was, how had Finnegan known that trick? He got out of the car slowly, struggling to grasp an idea which had burst into small flame in his mind. Finnegan had *not* known. He was as sure of that as he was that this was Sunday morning. He went round the cabin corner almost on tiptoe, suffused with a kind of inner itch, a feeling that he had something almost in his hand. And then he stopped, and stared, and flatly refused to believe the evidence of his eyes.

Immediately in front of the cabin porch there was a narrow, stilt-legged boardwalk, reaching out some fifteen feet over the still waters, to give easy access to the small flat-bottomed boat which lay moored at its far end. On

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this narrow, two-plank-wide jetty, sat Finnegan, his feet dangling within inches of the rippling water. He was hunched forward, peering down. As Lawrence watched, he drew something from his pocket and sprinkled the water. In his other hand, between his knees, was the thick end of a wooden pole.

"It's the boat hook!" Lawrence breathed, not daring to move.

All at once he saw Finnegan move, a sudden scooping jab and hoist, and out of the water came a splattering silver-scaled whopper, to come down with a thump on the planks, alongside two more. Casually, Finnegan reversed the boat hook, dealt his catch a vigorous wallop to quieten it, and went back to his task.

With a headful of blazing lights and spinning question marks, Major Lawrence wheeled and went into the cabin, to shake Colonel Scorth abruptly awake, to caution him to utter silence, to invite him to "Come and see for yourself." Scorth stirred, and grumbled, but had the sense to rise silently and come. And stare, all his fisherman's instincts utterly outraged.

"Damn it!" he spluttered, hushing at Lawrence's urgent sign, "You *can't* catch fish with a blasted boat hook!"

"I know that," Lawrence muttered. "*You* know it. But Finnegan doesn't. And he's doing it. I'll bet you he never caught a fish before in all his life. But he's doing it. Ben, come back inside. I want to talk, and you have to listen. Because I think I can make this thing add up, in a way."

As soon as Scorth was settled on the edge of his bunk, Lawrence began.

"Just try this for sound. Finnegan wants to catch fish, so he goes ahead and does that. Right? He probably knows that you're supposed to catch them with a hook. So he does. Now. Add on this. He's one of my men. On paper he's a maintenance mechanic. In cold fact he is absolutely useless and hopeless at anything and everything we've been able to try him on. He is a tech sergeant's nightmare. All left feet and thumbs. But not—I'm beginning to see it now—stupid. He just does not think the way we do. He doesn't know that a cushion-car is not designed to tilt up by the nose. He just wants it to, and he makes it do that. I've just found out how, and it gave me a headache figuring it out. I despair of ever finding out how he does certain other things. Like, for instance, when you put your call through to me, yesterday. He was on the switchboard, quite by chance. He routed the call through to me."

"So what's so remarkable about that?" Scorth grumbled. "I was trying to call you, wasn't I?"

"Sure. But I have my intercom rigged so that no calls get through to me except they first get to Captain Stevens —and Stevens wasn't in his office at the time. That call couldn't have come through. But it did. Just because he wanted it to, and he didn't know any good reason why not. I'm asking *you* to think, now, Ben," Lawrence said.

Scorth's face was furrowed in concentration. "Are you trying to tell me he has supernormal powers, wild talents—?"

"The hell with that. I'm telling you that Finnegan—and plenty more people like him—don't think the way we do. Somehow, they miss the logical steps, take flying leaps, and get there just the same. You said it yourself—every outfit has at least one like him, written off as dumb just because he can't follow our kind of thinking."

Scorth chuckled, suddenly. "You don't work with women, do you, Jack? Give thanks for that. I have an office full of them. You should try, sometime, to find a reference that has been filed away according to the feminine system. *They* can find 'em, mind. But I'm damned if I ever can. You talk about 'our' kind of thinking—I have one girl in my office who does nothing else but read handwritten letters. Doesn't sound much, does it? But I've seen her pick up a scrawl that looked as if it had been produced by a Chinaman with ataxia—I'll swear the man who wrote it couldn't read it back, himself—but she read it right off with no trouble. I ask her how, and she says it's just a knack. A knack!" Scorth fumbled for his pipe and a match. "All very interesting," he said, between puffs, "but I've no time—"

"Now you're really not thinking—" Lawrence could hardly contain himself as the ideas slid together in his mind and made a pattern. "Look—you've been trying to impress the Examiner with logic, with rational developments and achievements. And you're never going to succeed at that, because he has been trained, and briefed, and primed, with that kind of thinking—the accepted, so-called rational kind. What you should have shown him was not the developments, the results, the work-outs—but the origins! The pioneer work. The more I think of it, the more I can see it. Nothing—but nothing we have now, and call modern and progressive—began with logic and common sense. None of it. It all began with nonsense, impossibilities, ridiculous crackpot ideas, things that couldn't possibly work out—and blind accidents. And people like Finnegan. And intuition. If you're ever going to impress and surprise your Examiner—this is the way—with people like him."

Scorth's long face reflected the struggle within.

"I think you're right, Jack. I'm certain you are. And it's so damnably obvious, now you've said it. There ought to be a medal of some kind for what you've just done—"

"Not for me," Lawrence chuckled. "Pin it on Finnegan." He sniffed, and felt his stomach tell him what a fine appetite he had. "He has a knack with a skillet, too. Just take a good sniff of what I smell. You know"—he got up, slowly—"I'll bet you that lad doesn't know a thing about cooking, either!"

"I'll make it my business to shoot the first man who tries to teach him," Scorth vowed. "With that kind of knack, what does he want with lessons?" ■

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THE "HUGO" WINNERS

Robert Franson, publisher of *Science Fiction Review*, and the Convention issue of *Science Fiction Times*, perennial newszine of the SF field, reported almost simultaneously the results of the vote for best science-fantasy of 1963.

Analog was voted best professional magazine of the year, and another rocket was sent to be added to the others in John Campbell's "Cape Analog" collection. *Amra*, the handsome magazine of the sword-and-sorcery field, published by George Scithers, earned its award as best amateur magazine. Ace Books took a new award as best SF book publisher for its consistent program of paperback books, and Ed Emsh mowed down competition as best professional artist in the field.

Clifford D. Simak was the winner of the "big" Hugo for best novel of 1963. His book, "Way Station"—the story of the Civil War veteran who mans a transit point for extraterrestrial traffic—had also been serialized by *Galaxy* in 1963. The award for best short fiction went to Poul Anderson for "No Truce With Kings," published by *Fantasy & Science Fiction* and included in his collection, *Time and Stars*.

First Fandom's "Hall of Fame" award—the second—was made to Hugo Gernsback, for whom the "Hugo" awards are named.

As for 1965, the World Convention again goes to London. Further data as I get them. Rumor has it that there will be competition for the 1966 Convention when it returns to the mid-western section of the United States.

TRADER TO THE STARS

By Poul Anderson • Doubleday & Co., Garden City, N. Y. • 1964 • 176 pp. • $3.50

A few months ago a reader, in "Brass Tacks," was asking why Poul Anderson's stories about that old reprobate of galactic commerce, Nicholas Van Rijn, hadn't been collected in book form. Well, here are three of them, including "The Master Key," which was here in Analog last July. The other two have been out in Ace paperbacks: the first Van Rijn yarn, "Margin of Profit," in the collection which Ace published in 1962 as *Un-Man*, and "The Man Who Counts," second in the series, as *War of the Wing-Men* in 1958, shortly after its publication here.

This collection gives you "Hiding Place" (Analog, 1961), "Territory" (Analog, 1963) and "The Master Key." In each story, as you should know if you've read any of them, old Nicholas Van Rijn, interstellar trader of the Polesotechnic League, draws on his vast experience with races and peoples among the stars to find useful analogies and solve xenological puzzles. The action is lively, the conniving is a joy to behold, and Van Rijn always comes out on top. The question is, how is he going to do it?

As always, too, Poul Anderson is interpreting the past of mankind by projecting his future. The book is augmented with quotations from sources ranging from Shelley to "Margin of Profit" that make the valid point that even though the trends of history may not move in cycles, certain kinds of men develop or are developed to cope with certain world situations. During the Bronze Age, and again in the Fifteenth and Sixteenth centuries, unbalances bred an international clan of explorer-traders who were more like each other, and like their predecessors of an earlier era, than they were like the stay-at-homes to whom they brought profits and luxuries. The Northwest fur-traders of the Nineteenth Century knew the Indians of the Plains and the Rockies better than they knew the people back in the cities who wore the furs they bought and trapped and stole. The fur companies battled and cut throats and started Indian wars against each other, but among themselves they presented a fairly united front against the beaver-hatted snuff-takers in New York and London. And in the Twenty-first Century there are the trading companies and Van Rijn.

NIGHT OF MASKS

By Andre Norton • Harcourt, Brace and World, New York • 1964 • 191 pp. • $3.25

This is nominally a juvenile, because its two leading characters are a young boy and the teen-ager who has been tricked into kidnaping him. But I can assure you that when the paperback reprint appears you'll find it as vigorous a yarn of adventure against a hostile planet as any in the Norton library.

Nik Kolherne has lost his face and nearly lost his life in one of the interstellar wars. He is a castoff in the Dipple—the thieves' ghetto—of Korwar, when some plotters of the Thieves'

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Guild draw him into their scheme. He will be given the reconstructed face he can't afford—the face of the fantasy-companion of a young boy who is kept in protective custody while his father fights off a powerful set of enemies. As "Hacon" he can get young Vandy's trust and escape with him. And so he does—to wake up a prisoner on Dis, planet of a star that radiates mainly in the infrared.

Now the adventure really begins as Nik and Vandy escape, encounter the grim native life of Dis, find one faction after another of friends and enemies on their trail. The real nature of the plot appears, and so do remnants of one of those weirdly powerful elder races with which Andre Norton peoples the galaxy. It isn't one of her best stories, if only because the black murk of Dis is so hard to visualize, but it's better than most.

A GOLDEN ANNIVERSARY BIBLIOGRAPHY OF EDGAR RICE BURROUGHS

Compiled by Henry Hardy Heins • Donald M. Grant, West Kingston, Rhode Island • 1964 • 418 pp. • $10.00

This amazing volume, published in a limited edition, may be out of print and a collector's item by the time you read this. It was to have been published in 1962, on the fiftieth anniversary of the publication of Burroughs' first story, "Under the Moons of Mars," but the avalanche of new editions of Burroughs' books, still going on, and the wealth of new bibliographical information that followed Rev. Heins' publication of his previous looseleaf bibilography, made it necessary to keep the manuscript open. It still manages to appear in the golden anniversary year of "Tarzan of the Apes," the book that really launched the author's unique career.

The new, tremendously amplified bibliography defies description. As I said of the earlier edition, it is that rare thing, a bibliography that you will find yourself reading. The pure listing of books and stories, editions and their varying contents has been enriched with bits of information about Burroughs and how and why he wrote as he did. Jacket illustrations, interior illustrations, magazine illustrations, bits of memorabilia are used to round out the pages and reproduced by excellent offset. Forgotten articles by Burroughs, notes from his commonplace book, and a rich final section of magazine illustrations and reproduction of publishers' announcements from *Publishers' Weekly* serve the double purpose of making collectors' mouths water and showing Burroughs' books against the background of other books of their times.

Additions and corrections to the book, doubly necessary because of the publication of new hardbook editions by Canaveral Press and paperbacks by Ace, Ballantine and Dover, are already appearing in the magazine for Burroughs enthusiasts, *ERB-dom*, published by Camille Cazedessus, Jr., 2350 East Contour Drive, Baton Rouge, Louisiana 70809. Other bibliographical material is, of course, appearing in *The Burroughs Bulletin* and *The Gridley Wave*, published by Vernell Coriell of 6657 Locust Street, Kansas City 31, Missouri, and serving with his annual *Dum-Dum* as the journals of the Burroughs Bibliophiles.

If you can persuade your public library that it needs this bibliography in its reference section, you'll find a list of other past and present Burroughs fanzines on page 210.

THE TANDAR SAGA

By W. C. Hanna • Arcadia House, New York • 1964 • 190 pp. • $2.95

This is the best of the Arcadia science-fiction titles published so far, and that is saying very little. It is a mild, pleasant story of interstellar adventure with an obvious lesson that would have been par for the Thirties or even a little earlier, but is somewhat more modern in style than—say—Edgar Rice Burroughs' early yarns.

The people of Tandar are going to perish as their star grows cold. They have been roving the galaxy, searching for an unoccupied, habitable planet, but with no success. Twenty-seven ships have vanished without a whisper into the Dark Sector, and now Klaxor is going to follow them.

Like homing pigeons, they follow a chain of marvels straight to our Sun—chase a Venusian darling all over the solar system—discover that Earth is hostile—inadvertently start a war that wipes out all life here—and then find themselves in a hassle with another race of star-rovers over the embers. In the end, a solution for both worlds is found by the little fairies of Venus and everyone shakes hands all 'round.

Light, bland and with about the substance of cotton candy.

CLOSE TO CRITICAL

By Hal Clement • Ballantine Books, New York • No. U-2215 • 1964 • 190 pp. • 50¢

If you were reading Analog in 1958, when it was *Astounding Science Fiction* and this book was serialized here, you don't need me to tell you that it is a prime example of "hard" science fiction. Hal Clement doesn't write any other kind, although this book somehow lacks the appeal of his classic "Mission of Gravity," "Iceworld" or even "Needle."

The planet he has created is Tenebra, huge, furiously hot, where water is close to the critical temperature so that lakes and seas evaporate every day and condense again every night, where liquid and vapor are so little different that the falling drops of "rain" are gigantic sacs thirty and forty feet across, and where the things that can live are utterly strange by human standards. Nevertheless, there is intelligent life on Tenebra, and a sufficiently durable robot has been constructed and sent down to educate them. Like Dickens' Fagin, he works with the young: stolen eggs, hatched and brought up under his guidance—or that of the humans in orbit around the planet, who speak and act through him.

A kind of bathyscaphe is being outfitted to take the human scientists down to the surface of the planet. It breaks loose with two children aboard, the twelve-year-old daughter of a human psychologist and the offspring of an otter-like VIP, with a maturity comparable to a four-year-old. Problem: to rescue them.

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The story moves rather slowly at first, while we are following the school group, but it never lags once the rescue mission is under way. And you can be sure that the strange characteristics of Tenebra will be used to effect the rescue. Problem Two: Can you guess how it will be done?

THE PUPPET PLANET

By Russ Winterbotham • Avalon Books, New York • 1964 • 189 pp. • $2.95

This story of plot and counterplot is middle-grade Avalon. You won't remember it long after you've read it, but it will carry you along—sometimes pretty fast.

Domega is the planet of a star on the border between the human space empire and that of the hostile humanoid Arkads. Its "people" are something like intelligent amoebas—and for the purposes of the story, don't bother about the many articles that have pointed out how impossible this is. At any rate, they have the power—like that of the slime molds—to reassemble themselves in solid form and become replicas of plants, animals, human beings, Arkads—anything composed of living matter.

The human colony on Domega has kept a pretty rigid control over things, in spite of sporadic "Kammie" piracy ("Kammie" for "chameleons") and other outbreaks. Now, however, what looks like an armed Kammie revolt opens with the attack on a human ship and the slaughter of its crew. Captain Jerry Main discovers the ravaged *Polaris* and soon finds himself in deep trouble, with evidence that there is another group of plotters high in the Terran government. He is forced to throw in with the Kammie underground, or one sector of it.

Ride with it and you'll enjoy it. Fight it, and you won't.

THE OTHER SIDE OF NOWHERE

By Murray Leinster • Berkley Books, New York • No. F-918 • 1964 • 142 pp. • 50¢

You read another version of this rouser here in Analog a few months ago, as "Spaceman." If you're a very new reader, it's a straight adventure-plus-mystery yarn, set in the author's future universe of the landing grids—devices something like super-solenoids that lift spaceships out of a planet's gravitational field, or lock onto it in space and ease it down.

The *Rim Star* is a very strange ship with a very strange captain and an ominous crew, as First Officer Braden discovers before he has signed on. The first part of the story is devoted to Braden's efforts to find out what kind of trouble is brewing; the rest of the book deals with his and the captain's struggle to cope with it. This much can be said: the crew are pirates who have looted another ship and intend to take the *Rim Star*. They are as crafty as they are violent. And Braden draws on the folklore of space to defeat them.

Read through for the story; it's good fun. Then browse back and see just how much extra that old veteran of popular fiction, Murray Leinster, has unobtrusively fitted into and around his plot. If he's not Robert Heinlein's equal at this, he's in the same league. Which is, of course, one reason why you read the story here first . . .

THINGS

Edited by Ivan Howard • Belmont Books, New York • No. L92-582 • 1964 • 157 pp. • 50¢

This is not, as you might expect, another of the collections of weird and horror stories that have been coming out more and more frequently, and that are off-limits here—unless, of course, they originated in *Unknown Worlds*. Ivan Howard is showing that he has a real ability to ferret out neglected stories that are good reading, though they may not be great, and here are six of them to prove it.

My favorite in the lot is Lester del Rey's "Mind of Tomorrow," both because it's a very long time between del Reys, and because this is a prime example of his ability to make a tired old theme fresh. This one is the post-WW III world in which remnants of American civilization are scavenging the ruined cities of the past, but it's also a rich job of characterization. The last is Noel Loomis' "Little Green Man," a Uranian whimsey in which odd things happen mainly because you have to have odd things happening in a science-fiction yarn.

Poul Anderson has also refurbished an old theme well in "Courier of Chaos," in which the time-traveler from a future-long-after-Man comes back to find out why Mankind perished. Raymond F. Jones does even better with some thought-provoking problems in values in "The Gift of the Gods"; a starship comes to Earth, and the nations struggle for its secrets. Finally, James Blish has what is no more than a vignette of the future in "Turn of a Century," a bothering glimpse of the night of December 31, 1999.

SON OF THE TREE
THE HOUSES OF ISZM

By Jack Vance • Ace Books, New York • No. F-265 • 1964 • 111 + 112 pp. • 40¢

Back in 1951 and '54 when these stories were first published, Jack Vance was writing just as lively, colorful yarns as he does now. Preposterous, if you like—but they do move.

"Son of the Tree" is the better and older of the two. An Earthman, Joe Smith, on a rather stupid quest, arrives on the planet Kyril where an enslaved Laity support the Druid priest-class in worship of the colossal Tree. What matter that its tissues would have to have properties that metals don't have: from the moment Joe Smith sees it, the Tree impresses itself on the story as a monstrous emblem of thoroughgoing wrongness. And presently he is up to his ears in a plot to export the Tree, or its "son" to another, barbarous world where Kyril and the "ornate, involute and subtle" Mangs are in conflict. There is one of the most cheerful collections of skulduggers you're apt to encounter, with the old reprobate Hableyat most dangerous and likable of them all.

On the flip side, Earth botanist Aile Farr has gone to Iszm to have a mildly academic look at the tree houses of that biologically remarkable world. The plantation owners of Iszm grow

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their houses—and everything else—on teased and tortured trees, and export a few of them to other worlds. Said worlds would like a few seeds or seedlings of female, fruit-bearing trees themselves, and Farr is immediately taken for a spy and finds himself in violent trouble, both on Iszm, on Earth, and in space between.

Incidentally, the Balkanization of space that Vance has used in these stories, like others before and after, is far more logical than the close-knit empires of space that we find in other stories. The great breeder of races and cultures has been isolation, and isolation is the keynote of space. Given time, and strange enough worlds, who knows what may become of Earth men?

THREE WORLDS TO CONQUER

By Poul Anderson • Pyramid Books, New York • No. R-994 • 1964 • 143 pp. • 50¢

I ordinarily shy off from books that keep two or more plots in the air simultaneously. This is undoubtedly pure laziness or flibberty-mindedness on my part. In any case, books like this one prove the rule is a bad one.

I don't know whether the title is the author's or the publisher's. The action takes place on only two worlds—Jupiter and its satellite, Ganymede. Earth, the third world, is an important offstage participant, since the counter-revolution of a totalitarian regime against its overthrowers touches off the human conflicts, but it stands in about the relation of the ghost in "Hamlet" to the rest of the story.

This is, as I've said, two stories: the struggle of Mark Fraser, Ganymede colonist, against the battleship *Vega*, whose captain intends to make Ganymede a base for the return of the old guard, and the struggle of the native Jovian, Theor, to lead his people against an invading horde on the utterly strange surface of the giant planet. Fraser has become Theor's friend and adviser via a kind of long-distance computer-translator, and the fact that the two "men" are involved in simultaneous crises and in and out of communication at irregular intervals adds to the suspense.

Both worlds are realized about as well as Hal Clement would do, and only a Clement would be able to find much fault with them. It is particularly fascinating to watch the ammonia world of Jupiter unfold as seen by Theor—a world whose metal is high-pressure ice, whose volcanoes belch molten water, and whose atmosphere is torn by strange forces and harbors the even stranger things that Theor experiences before his personal struggle, and his people's, is over.

This kind of science fiction is considered passé by some of the new generation, but let's hope it never goes out of style.

THE SECRET PEOPLE

By John Beynon Harris • Lancer Books, New York • No. 72-701 • 1964 • 175 pp. • 50¢

Don't confuse this book—as I did for a long time—with the several others of the same name. It was the first book-length adventure novel by the English writer who is now better known as "John Wyndham," the name under which he writes an introduction to this revival from 1935. Published and later serialized in England and Canada, it didn't reach the United States until *Famous Fantastic Mysteries* did a condensation in 1950—so this is the first U.S. edition of the complete story.

Beynon/Harris/Wyndham is probably the closest we have to H. G. Wells in style and treatment, though his themes are far more modern. In this case he was also slightly seasoned by H. Rider Haggard.

The hero is a wealthy sportsman whose rocket plane crashes in the New Sea which is being formed in the Sahara lowlands. The sea breaks through into a cavern world under the desert, taking the crippled plane with it. Here Mark Sunnet, his girl friend and their cat are taken prisoners by a race of cave-bleached pygmies who inhabit the sub-Sahara underworld, living on giant mushrooms and lighting their way with mysterious cold-light bulbs. They have the degenerate remnants of an ancient Egyptian religious cult in which the cat is a representative of the goddess Bast and the girl is the cat's attendant.

Meanwhile two processes are proceeding neck-and-neck: the destruction of the cave world by the drainage from the New Sea, and the attempts of the prisoners—there are many of them—to escape, much in the tradition of the British Army Escape Committees. The plot develops smoothly and rapidly, there are plenty of nice touches in the now well-known Wyndham manner, and some editor of the late '30s had rocks in his head if he turned the yarn down. It would have been a stand-out then, and it is eminently readable now. Lancer is still batting very very well in these "Science Fiction Library" reprints.

REPRINT ROUNDUP

SPECTRUM II

Edited by Kingsley Amis & Robert Conquest • Berkley Books, New York • No. F-950 • 1964 • 256 pp. • 50¢

This is considerably better than the first *Spectrum* anthology for Britons (*Spectrum III* is already out over there).

THE HIGH CRUSADE

By Poul Anderson • Macfadden-Bartell Corp., New York • No. 50-211 • 1964 • 160 pp. • 50¢

The grand yarn about the English knight who went crusading in Space. It was here in Astounding in 1960.

THE FALLING TORCH

By Algis Budrys • Pyramid Books, New York • No. F-1028 • 1964 • 158 pp. • 40¢

New printing of a good book.

SAVAGE PELLUCIDAR

By Edgar Rice Burroughs • Ace Books New York • No. F-280 • 1964 • 221 pp. • 40¢

Paperback of last year's Canaveral edition of Burroughs' first posthumous book. The capture-and-escape-among-freaks formula is as usual, but O-aa is perhaps Burroughs' most lively and interesting heroine. The Frazetta cover shows her to good advantage.

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BRASS TACKS *continued from page 4*

break no faster than the speed of sound in steel—about three miles per second. The difference in strength between the weakest place and the strongest place is anybody's guess—let's estimate it as equivalent to another two minutes of stretch. In two minutes, strain relief coming in from both ends could keep a piece of shaft 720 miles long from breaking. Typical pieces will probably be more like 50 to 100 miles in length.

At the ends, strain relief will have been traveling along the shaft ever since relativistic stresses began. This is maybe as much as ten minutes, so the two end pieces will be up to 1800 miles long. This is so short that although the rear end of each piece must accelerate a little faster than the front end—be pulled along by tension in the shaft, that is—the extra acceleration will be only about one thirtieth of one g.

So when dawn breaks, each of the two observers will find his sun dimmed by ten per cent, which is too small a change to notice without instruments. The dimming will actually consist of an irregular off-and-on flickering somewhere around 2,000 times per second, which again is much too fast to notice without instruments. So the observers will both declare everything is normal.

The possibility is also mentioned that the shaft might be made of steel dust. If the dust is fine enough, thinning it out by a factor of ten would still leave it opaque, in which case no one would see his sun the next morning. The same effect could be achieved by building the steel shaft of short overlapping laminations.

Going back to the "twin effect," it is incorrect to say that it is an underlying assumption of relativity that all frames of reference are equally valid. Einstein proposed *two* theories of relativity—the special theory and the general theory. It is the special theory that has had such overwhelming experimental success and that has produced all the important predictions, including atomic energy, the twin effect, the shortening of moving rods, the slowing of moving clocks, and the impossibility of exceeding the speed of light. In the special theory, it is only all *inertial* frames of reference that are equally valid. This rules out rotating and accelerating frames of reference. The traveling twin will admit his frame of reference was accelerated when he turned back toward home, so he can not claim it valid to use his frame in making age calculations.

In the general theory, which has never been satisfactorily completed, all frames of reference are valid but may be warped by the behavior of matter in them. For example, in the frame attached to a rotating merry-go-round the stars are all whizzing around and around the universe at fantastic speeds, which accounts for the "gravitational" field directed outward from the center of the merry-go-round—actually a warpage of the space-time continuum. In the frame attached to the traveling twin, all the stars move one way and then turn around and move the other way, which sets up a warpage that makes time run much faster back at the distant home planet, so that when the twins are reunited, the earthbound one has aged more.

Thus both theories of relativity predict the twin effect. The denial of the effect by some is based on emotional, not scientific, reasons. They don't *want* it to be true.

ALLAN BEEK
28 Beacon Bay
Newport Beach, California 92662

Well, even if true, that "twin effect" won't do anybody any emotional good. You may live a thousand years, but you won't know it, so what's the use?

Dear John:

The paradox presented in Philip Hawley's "Relatively Episode No. 1" (August 1964) is not a paradox at all for a very simple and a very logical reason that it couldn't happen! The joker in the deck is the matter of accelerating a massive body eleven light-years in length along its *entire length* in a matter of hours. A little thought into the ways and means of accomplishing such a feat will show that there is no possible way it could be brought about. We are talking here about a disturbance in a system eleven light-years long. Whatever the source of this disturbance (and let's stick to physically possible sources—no fair postulating an unknown force) it cannot possibly take effect over the entire region occupied by the rod (whatever material it may be made of) in a matter of hours. In fact, any physically possible way of accelerating the rod by even a fraction of an inch per century would take at least eleven years.

The paradoxical situation in the "Relativity Episode No. 1" is, therefore, an unreal situation and therein lies the solution to the paradox. Or: When is a paradox not a paradox? Answer: When it isn't.

S. W. P. WYSZKOWSKI, P. Eng.
Box 3372, Station C
Ottawa 3, Ontario
Canada

That's an easy way out—but not acceptable! We mount rocket motors at 1,000 foot intervals along the rod, and by previously arranged agreement, turn them all on at the same instant. Remember that phase velocity readily exceeds the speed of light.

Dear Mr. Campbell,

The real problem with "*Relativity Episode #1*" for your readers lies in their seeming assumptions that they are to solve a problem in special relativity. Unfortunately, the problem deals with *general* relativity, since it deals with an accelerated reference frame. Equally unfortunately, unless your readership consists of theoretical physicists, this effectively limits further discussion of the matter, as the mathematical aspects of general relativity, unlike those of special relativity,

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are advanced indeed.

However, for those who care to pursue the matter further, the problem is worked out in detail on p. 255-p. 257 of C. Moller's "Theory of Relativity," 1st ed. 1952, Oxford University Press. As for Mr. MacFadyen's letter in your October issue, I can only comment that the Clock Paradox is worked out on p. 258ff op. cit.

I leave everyone to draw their own conclusions.

DAVID A. LENNETTE
Physics '66
UC Berkeley

The textbooks always have a good, clear, definite solution—because they don't discuss the questionable or irresolvable cases!

Dear Mr. Campbell:

Dwelling upon the Relativity Episode #2, I decided to give the ghost of John R. Phizzit a speedometer to look at. It is a spectroscope which measures the doppler shift to give the approach velocity of the Ceespeed One towards a certain star, upsilon four Eridani. This star has two spectral lines:

Hydrogen γ 4340.477 A
Magnesium 4481.288 A

As the ship nears c, the lines are seen at 8680.953 A and 8962.575 A. The two lines form a check on each other. v_4 Eridani is a spectroscopic binary and each line splits by a relative radial velocity of 132 km/sec twice every 5.01 days. Without accelerating, sooner or later, the Ceespeed One will be approaching the binary at almost c plus 66 km/sec and at almost c minus 66 km/sec. Since the ship is traveling at more than c minus 66 km/sec, it is traveling faster than light toward the approaching component of the binary system. What does the speedometer record for the benefit of John R. Phizzit's ghost? The spectral lines split as they have done while the ship was approaching c but the displacements of the lines are no longer in step. The line of the approaching component has its maximum displacement before the line of the receding star has its maximum displacement. My conclusion comes from the idea that a person swimming into waves meets them sooner than a person who is treading water.

Although my conclusion hasn't got a ghost of a chance, I wrote it in the spirit of things. The values for v_4 Eridani came from "The Binary Stars," by Robert G. Aitken, New York, Dover Publications 1964, p. 133.

THOMAS G. COOK
3402 University Hall #3
Cornell University,
Ithaca, N. Y.

So, for one of the stars the Ceespeed One must be the Hypercee One?

Dear Mr. Campbell:

You are going to get lots of argument about your bit of cuteness on pages 79-80 of the October 1964 issue; but by sending this air mail the day my copy of the magazine arrives perhaps I can get in ahead of the crowd.

In your "answer" you are guilty of one arbitrariness and one error.

The arbitrariness is in saying that the International Date Line is, "by definition, both the farthest east, and the farthest west you can go." Whose definition? Such a convention could be established, but it never has been in any circles, scientific or social, with which I am acquainted. I have crossed the Pacific in both directions, and I didn't stop going west when I crossed the Date Line from the U.S. to Asia, nor did I stop going east when I crossed the Date Line coming the other way. In ordinary usage there is no "farthest west" or "farthest east" one can go on the surface of the earth. West and east are directions, not places.

Throw that out, if you like—but your answer is still wrong, because the International Date Line does not cross Alaska. Mainly the Date Line goes along the 180th meridian; but it curves eastwards to pass through Bering Strait instead of cutting off a piece of Siberia's East Cape, and it swings way west to avoid cutting through the Aleutians. So Alaska is the state that stretches farthest west by anybody's definition; but Maine is the one that stretches farthest east even by your idiosyncratic definition.

Now here are two for you—and there are no tricks in these, either. (1) On what piece of the United States (state or territory) does the sun rise first each morning? (2) How many time zones are there in continental North America? How many in the United States (excluding territories)?

CHARLES F. HOCKETT
145 N Sunset Drive
Ithaca, New York

O.K.—so I shouldn't have said "date line" but "180th meridian". That one was pulled on me by a Navy navigator —and parts of Alaska are East of Greenwich and parts are West of Greenwich, by definition, which is what geographer's go by! Thanks for your two puzzlers; I'll let the readers have fun figuring it out!

Dear John,

Re N. E. W. S. question October Analog. Suggest you take a good look at a map or rephrase your answer.

Alaska is *not* the farthest east state by your definition. Since the international date line jogs around the chain (Aleutian) and is west of Little Diomede Island, Alaska celebrates the same days at the same time as the rest of America. Using your definition that the date line is the farthest west you can get, then Alaska does not go across it, and Maine becomes the easternmost state. If, however, you change the answer to your question to read the 180th parallel, then Alaska is the easternmost, since the Near and Rat Island groups of the Aleutian chain are east of this line, with the 175th eastern longitude falling approximately between the two groups.

We Alaskans are naturally happy to be mentioned three times in one issue of Analog since a little advertising never hurts.

PETE DAVIDSON
Kotzebue (66 30N 162 30W) Alaska

Another of the scores of letters that caught my goof on that one!

Dear Mr. Campbell:

The denouement in "Professional Dilemma" was not wholly satisfactory. I am afraid that on Mr. Spardleton's next encounter with Mr. Bloodletter,

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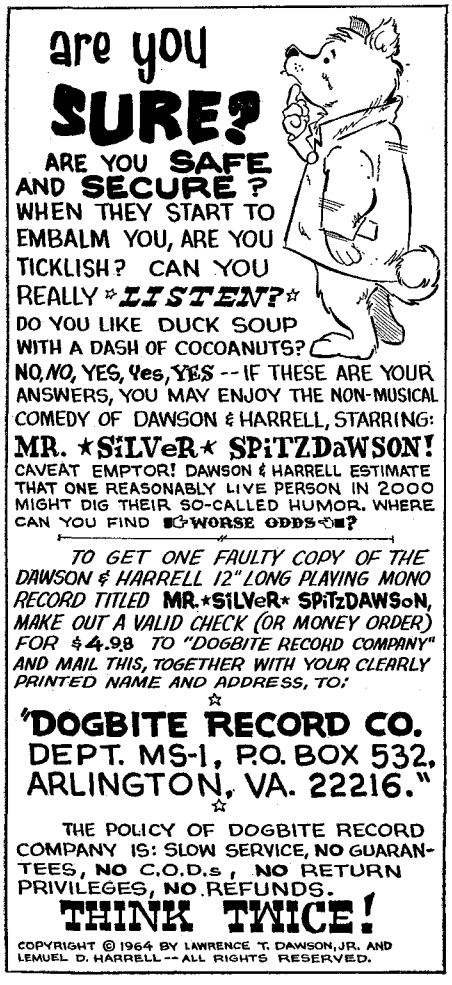
BRASS TACKS

the latter cited *Shellmar Products Co. v. Allen-Qualley Co.*, 36 F.2d 623 (7th Cir. 1929), in which plaintiff disclosed to defendant a new product and a machine for making that product. Thereafter defendant purchased from a third party prior and controlling patent rights. Despite defendant's ownership of the prior rights, the court held for plaintiff, and in fact required defendant *to transfer to plaintiff the patent rights which it had purchased.* In Mr. Spardleton's words, ". . . a little off the point from our case here, but that won't stop Bloodletter."

DAVID L FOSTER
1750 Union Commerce Building
Cleveland, Ohio 44114

The only excuse for that sort of thing is, as Lockhard said, "The Doctrine of the Deep Pockets!"


are you
SURE?
ARE YOU SAFE AND SECURE? WHEN THEY START TO EMBALM YOU, ARE YOU TICKLISH? CAN YOU REALLY ☆LISTEN?☆ DO YOU LIKE DUCK SOUP WITH A DASH OF COCOANUTS? NO, NO, YES, Yes, YES -- IF THESE ARE YOUR ANSWERS, YOU MAY ENJOY THE NON-MUSICAL COMEDY OF DAWSON & HARRELL, STARRING:
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THINK TWICE!
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Dear John:

I tried to answer your question on which of the American states extends farthest north, east, west and south —page 79 of the October '64 issue. I got three of the four, but missed the farthest east, picking Maine.

However, let's quibble. There are no less than three ways of interpreting north, east, west and south, which we will call 1) Subjective, 2) Objective, space, and 3) Objective time.

By the subjective method we can say: "Suppose you are at the geographical center of the fifty states. Which state is farthest to the north of that center? East? West? South? It is assumed, of course, that you travel less than halfway round the world in coming to your decision. Otherwise you can say New York is farther west than California, if you head west and *keep on going.* By this subjective method, Alaska is farthest north and west, Hawaii is farthest south and Maine is farthest east. That was my answer. *However, this was not the criterion of north, east, west and south that you used.*

Let's try the objective method (space) next, and define "farthest north" as being nearest the North Pole, "farthest south" as being nearest the South Pole, "farthest east" as having the highest value East Longitude, and "farthest west" as having the highest value West Longitude. The high values of East and West Longitude meet at 180° and the 180° line passes through the state of Alaska. To be exact it passes through the Aleutian Islands just east of Semisopochnoi Island. Any state through which the 180° meridian passes is both farthest west and farthest east and Alaska is the only state that qualifies. Consequently, by the objective method (space), the answer is that Alaska is farthest north, east, and west and Hawaii is the farthest south. That is your answer, John. *However this method is not the criterion of north, east, west and south that you used either.*

Let's summarize, so far. By one criterion of what the question means, I am right, and by another you are right, and you used neither criterion!

Now for the third criterion of direction, the objective method (time). We can define "farthest north" and "farthest south" as being nearest the North Pole and nearest the South Pole, respectively, as before. And we can define "farthest east" as being as far east as one can go up to the point of contact with the International Date Line (which deals with time and not space), while we define "farthest west" as being as far west as one can go up to the point of actual contact with the International Date Line. This means that any state that is crossed by the International Date Line is both farthest east and farthest west, *and this is the criterion you used* as is plainly stated in your answer on page 80.

BUT, and here you forfeit your own claim to Professional Geographer, the International Date Line is *not* identical with the 180° meridian and it does not cross any significant land area. In particular it does not cross any American state, and in most particular it does not cross Alaska. The state of Alaska is wholly to the east of the International Date Line. Therefore, by your criterion (!), Alaska is farthest north and west and Hawaii is farthest south. However, Maine (and not Alaska) is farthest east. By your criterion, then, I'm right and you're wrong.

Now, John, this, I admit, is the merest quibble and I wouldn't dream of using this argument with anyone else. But you are the most skillful man with a quibble I have ever met and I have no doubt you'll quibble your way out of this. In fact, I'm curious to see your answer to this letter, if you should happen to run it in Brass Tacks. About the only thing that would surprise me is if you ran simply "Oops, my mistake!"

ISAAC ASIMOV

Oops! My mistake! I meant to say the 180°th meridian—I got suckered on that one by a Navy navigator, who did say "180th meridian" of course.

Approximately one hundred fifty people have, so far, called my attention to that goof.

So O.K.—you can have fun with your friends on it.

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under certain circumstances, the light radiating away from a luminous body would tend to circle around a spheroidal universe and return to its starting point, only to begin another circum-universal journey.

Now consider an observer on Earth. Suppose he could see some of the light originally emitted by his own Milky Way. Even though the galaxy would have moved away from its original location during the time it took the photons to travel around the universe, still some of the photons may have scattered enough to be picked up on Earth. What would the observer see? The image of a faint galaxy, at a very remote distance from the Milky Way. He would never recognize the image in his telescope as his own galaxy!

Eddington called such a trick result a "ghost image." He developed the concept of ghosts as a mathematical curiosity rather than a serious physical possibility. Such phenomenon could only happen, Eddington believed, in a perfectly spherical transparent universe.

But if photons could travel indefinitely around the universe, and register ghost images when a few of them stray into terrestrial telescopes, what would the observational results be? (Agreed, this is a totally unsupported *if;* we warned you that this article would be speculative.)

Again, considering only a packet of photons from our own Milky Way, we have seen that an observer on Earth, picking out some of these photons after they had circumnavigated the universe, would mistakenly believe he saw a distant galaxy. The light would be red shifted, probably, due to gravitational drag. The same packet of photons—diminished in numbers, but still hurtling along at light speed—could make a second trip around the universe and delude the observer into thinking he saw two galaxies, the second twice as distant as the first. For each time the light from the Milky Way circles the universe, an observer could see another galaxy, farther away.

Now suppose that the universe contains a few thousand galaxies, instead of the billions that are now thought to exist. Suppose further that the universe is roughly spheroidal and much smaller than the multi-giga-light-years presently envisioned as its radius.

Over the course of eons, each galaxy could produce myriads of ghost images that would be picked up by observers on any other galaxy. The older the light, the more circuits it would have made around the universe, and the more galactic ghosts it would create. Observer would "see" untold billions of galaxies, stretching out to immense distances. Moreover, the farther the galaxy—that is, the more revolutions its light has made around the universe—the greater would be its red shift. It would seem as though the entire universe of galaxies were expanding!

The quasi-stellar sources, then, might actually be the oldest ghosts of all.

Now let's carry this line of speculation a bit farther. There are many peculiarities about the quasars that have not yet been explained, despite the many theories proposed about them. Two major problems exist:

1. The quasars' output of optical and radio power is so huge that cosmologists have been hard-put to find an energy source that can explain them. If the energy source is nuclear, it would require the simultaneous explosion of billions of supernova stars. Nothing known in nature could reasonably cause that to happen.

2. One of the quasars fluctuates in brightness over a period of about a year, with a longer fluctuation mode of about ten years superimposed atop the one-year period. If the quasar is truly a galaxy, its diameter should be many thousands of light-years. How can you make an entire galaxy change brightness within a few months? Individual stars simply do not blink on and off in unison. And a disturbance of some sort traveling the width of the galaxy could not possibly affect more than a tiny fraction of the galaxy in a year, or even in ten years. Not unless the disturbance traveled considerably faster than the speed of light . . . which is—we are told—impossible.

But these two big peculiarities can be explained rather tidily if we assume that the universe is a Hall of Mirrors, and that the speculation about galatic ghosts is valid. The conclusion reached is rather astounding: *the quasars might very well be the original Big Bang, the explosion that originated the universe as we know it!*

Look at it this way:

The Big Bang occurred some 10 billion years ago. When we look backward in time at the quasars, we are seeing the original explosion. We see many quasars simply because the photons emitted in the Big Bang have been so scattered by their many, many trips around the universe that they present many distinct ghost images.

Some of these ghost images fluctuate in brightness because the photons causing them have been subjected to unusual disturbances during their travels through space. For example, a stream of photons that passes along the edge of a turbulent cloud of interstellar gases might be absorbed more strongly at one moment than at the next. Such a condition could produce a fluctuation in brightness of the ghost image we receive on Earth.

We may then be seeing the origin of the universe when we photograph the puzzling quasars. One possible indication of this would be if the quasars are found to brighten with distance. This would mean that we are seeing them closer to the first moment of the original Big Bang.

How small is the universe?

Gigantic, still—but perhaps much smaller than most cosmologists now believe it to be. Perhaps small enough for us to actually see the very beginnings of it all once we get large telescopes in orbit. An actual determination of the universe's real size might be rather tricky to pull off, though. After all, have you ever tried to measure your own height in the Hall of Mirrors at the amusement park? ■

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RACE RIOTS

continued from page 7

vast difference must—loathe the idea however much he may—explain why the millionaire's sons aren't consistently brilliant, creative, constructive and highly civilized individuals.

Because, quite clearly, despite all those advantages, they aren't consistently what the social-liberal insists good opportunities would make of everyone!

No—there's Nature in there, as well as Nurture. And genetics plays a role that education simply cannot do anything about. There's one very simple fundamental that constitutes an absolute block on the possibilities of education: *You can not teach an organism how to learn.*

The ability-to-learn *must* be genetically endowed; if the ability-to-learn is not already present, then all efforts to teach must necessarily be futile.

Now a chimpanzee can be taught many things—more, and more complex behavior patterns than, for example, a dog. But it can *not* be taught to understand and use word-symbols. It lacks the ability-to-learn speech-symbology. No amount of patient effort can teach what the chimpanzee's mind lacks the ability to learn.

How long must one expose a piece of film coated with a sodium chloride-gelatine emulsion to get a picture? A silver-chloride-gelatine emulsion will record a picture in a millionth of a second—but sodium chloride lacks the ability-to-respond-to-light. No amount of exposure will ever produce the desired recording.

Dogs have been selectively bred by Man for about 200,000 years—say 100,000 generations. The modern Border Collie, like other true working dogs, can learn a quite extensive vocabulary of true sound-symbols; they do learn to understand speech. They are not as intelligent as the chimpanzee—but they have one specific ability-to-learn that the chimpanzee simply lacks.

Point: The existence of a high degree of intelligence has no correlation whatever with *specific* learning abilities.

The chief statistician for one of America's greatest public utilities once took a series of aptitude tests, to aid psychologists who were trying to calibrate their tests in terms of aptitudes-shown vs. success in fields of work. That is, what aptitudes does an individual who succeeds as an engineer show? A banker? A research chemist? Or, in the case under test, a statistician.

One aptitude he lacked with almost incredible completeness was any sense of spatial geometry. Given a wooden cube, which had been sawed up into nine wiggly, irregular blocks, and asked to assemble the scattered pieces—after forty-five minutes of futile trying, they gave up. Most people need about three minutes; mechanical engineers usually succeed in about forty-five seconds.

Both the psychologists and the statistician were fascinated by this remarkable lack of solid-geometry insight, and agreed to try a teaching program. Over the course of a week or so, the statistician laboriously practiced assembling the wiggly blocks, until he finally was able to do it in about five minutes.

Then they gave him an exactly similar collection of wiggly blocks, but only one-half the size he'd practiced with.

At the end of thirty unsuccessful minutes, he went back to being one of the country's greatest statisticians, and they went back to aptitude testing.

Intelligence has nothing whatever to do with *specific* learning ability.

A specific learning ability can be bred into a genetic line, given time enough, selective breeding, and a reasonable mutability of the organisms being bred. (That's why dogs now understand speech-symbols.)

Some human individuals can't learn to be civilized. Genetics being a statistical thing, the son of five generations of highly civilized men may happen to miss the gene-pattern required, while the son of twenty generations of barbarian warriors shows up with it.

The essence of a learning-ability is, it seems to me, a built-in genetic ability to *enjoy* a specific activity. The Lamb can *enjoy* eating grass—and, incidentally, gets nourished thereby. If we could somehow make a Lion *enjoy* eating grass, he would happily chew away at grass, worried only by the extremely inefficient job his carnivore-style teeth did on chewing the stuff. (He would starve to death, of course, but he'd starve happily.)

The scholar *enjoys* studying. The athlete *enjoys* physical activity. The two are mutually exclusive only to the extent that both require time, so we find both scholarly athletes, scholarly nonathletes, and athletic nonscholars.

The trouble with the Barbarian is that he specifically enjoys fighting, and specifically hates working for a living. To him, working for a living is dishonorable, unmanly, slavery—anathema. He can enjoy fighting, though he is fully aware that it has a high probability of killing him. (Remember that a nuclear physicist deeply enjoys working with materials that he is acutely aware can kill him. The chemist continues to do research on materials that he knows are extremely explosive, enormously poisonous, or viciously corrosive. Risk stops neither the citizen nor the barbarian.)

The Barbarian can fight for a living, in any variant of the concept of "fight". These include actual paid-mercenary action, fight-and-loot—which he prefers, of course—on through stealing, swindling, blackmailing, extortion, et cetera. He would, by reason of that general mechanism, rather rape a woman than earn her love, rather seduce her by false promises than marry her—because the latter is a form of slavery, in his opinion. He could not *enjoy* her love—but would delight in his conquest of her. (And don't pity the Barbarian woman; she agrees in full!)

Now history has some six thousand years of records showing the essential pattern of Barbarian behavior. It's quite consistent, whether you study pre-Hellenistic Greek Barbarians as seen by more nearly civilized early

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Egypt, Mongols as seen by civilized Chinese a thousand years ago, or the problem in central Africa today.

The Barbarian is born with the characteristic that he *can not work for a living*. He *can't* lie down with the Citizen, and co-operate in a constructive, co-operative, eight-hours-a-day building operation. He *can't*—no more than the Lion can live if he lies down with the Lamb.

After the Harlem riots, one Negro rioter said to a newspaper reporter, "They're killing us psychologically, damn it! They're killing us slow! If they're going to kill me, I'd rather they did it with a bullet!"

He was speaking the exact truth. The city-culture is killing them—the Barbarians—psychologically. It must; it cannot live with them, and they cannot live with it. And the Barbarian would rather die by a bullet; he doesn't mind the risk of fighting, any more than the dedicated scientist minds the risk of riding a rocket into orbit.

That rioter who'd rather die by a bullet wasn't saying that because he was a Negro; he was speaking for all the Barbarian rioters, black and white, Jew, Christian, Mohammedan or Buddhist, in all civilized lands everywhere. He *thought* he was talking about Negroes, when he said "They're killing *us* . . ."—but remember that only a minute percentage of Negroes were actually involved in the rioting, while very considerable numbers of whites joined in the spree of Barbarian-style looting, fighting, and destruction.

I have a little parlor game I like to play on people; you can try it yourself, if you don't mind losing a few friends. It's called "You be Dictator." It's quite simple; you simply say to your victim. "You've just been appointed Absolute Tyrant Dictator of the Earth. Now tell me—what do you do about this problem . . ." and name the problem he's sure he knows the answer to.

Like, "Now you're Dictator—*you* solve the problem of what to do with the Barbarians in our city-civilized culture!"

The thing that makes it so deadly a problem is that some of those Barbarians the city-culture *must* kill either psychologically or physically, will be the sons—and daughters—of your own officers and administrators.

The trouble of the Barbarian in the city-culture stems from the fact that they are a race-within-any-and-every-race.

One of the major reasons the Negro people are having so much trouble gaining acceptance is, simply, that the Negroes are not doing an adequate job of disciplining their own people, themselves.

There are three possible forms of discipline in the Universe; any individual or group has a choice of which of the three he will choose—but there is absolutely no escape from the necessity of choosing. Discipline you will get, whether you like it or not; your choice is which form of discipline you want, not whether you'll accept it or not.

There's Universe Discipline. If Baby sticks his hand in the boiling water—that's what he gets. Or, if he crawls out the fifth-story window. Or, if an African tribesman, convinced that his magic charm makes rifle bullets turn to water—he gets Universe Discipline.

Then there's Other-People Discipline. That's what Baby gets when Mama slaps its hand away as it reaches for the boiling water, or grabs Baby as he starts out the window. Or what the tribesman gets if he's arrested and jailed before he gets a chance to charge the machine gun.

Then there's Self-Discipline. Which is what you use when you get tired of getting your hand burned by the scalding water, and also get tired of having people slap it away from what you want to reach. It's what you achieve when you recognize that the magical charms won't work, and charging machine guns won't give you even a chance of surviving the fighting, and, somehow, learn to enjoy working your way up to having your own machine guns.

The disappointing part about Self-Discipline is that, when you finally achieve what you set out for, you find your wants have changed, and your achievement is, somehow, unimportant. Like the kid who, at age ten, promised himself that, when he grew up and had all the money in his pocket that adults had, he was going to have an ice cream soda and a bag of popcorn every time he wanted one, by gosh.

Well . . . in a sense, he does. He just doesn't seem to want five sodas and fifteen bags of popcorn a day now that he's grown up.

So by the time the African tribesmen grow up to the Self-Disciplined civilization level of producing their own precision machine tools to produce precision machine guns, and the high-level chemical industry necessary to produce the metals and the explosives required to earn their own machine guns . . . they'll be disappointed. They'll be all equipped with a high-level military technology—and no desire, any more, to use it. They'll be citizens, and citizens, unlike Barbarians, just don't enjoy fighting.

The Barbarian's inevitable and highly suicidal error is to think that, because the citizen obviously hates fighting, the citizen must be unable to fight well.

So . . . there you are, Absolute Tyrant Dictator of the world.

How are you going to make the Barbarians in your city-cultures learn to enjoy discipline—and choose Self-Discipline?

But remember—the true Barbarian *can't* learn that—any more than the Lion can learn to lie down with the Lamb.

Oh, by the way—heroin and cocaine may be very useful to your program. They'll keep a Barbarian happy with delusions and illusions. If you just see to it he has an ample supply, he will cause you very little trouble. It has the advantage, moreover, of killing him both psychologically and physically, without arousing any protest on his part.

But you're the Dictator!

What's your brilliant solution to the problem of the born Barbarian in your own family . . . ? THE EDITOR

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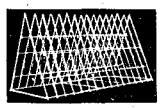

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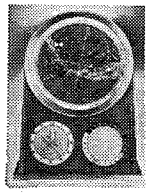

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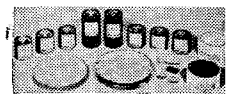

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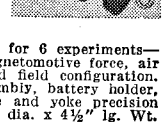

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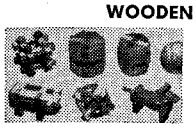

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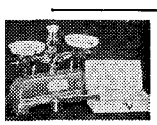

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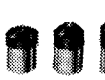

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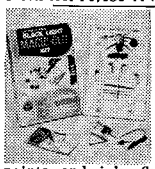

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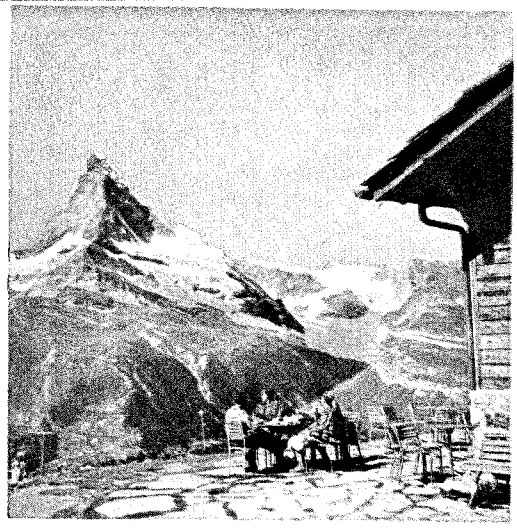

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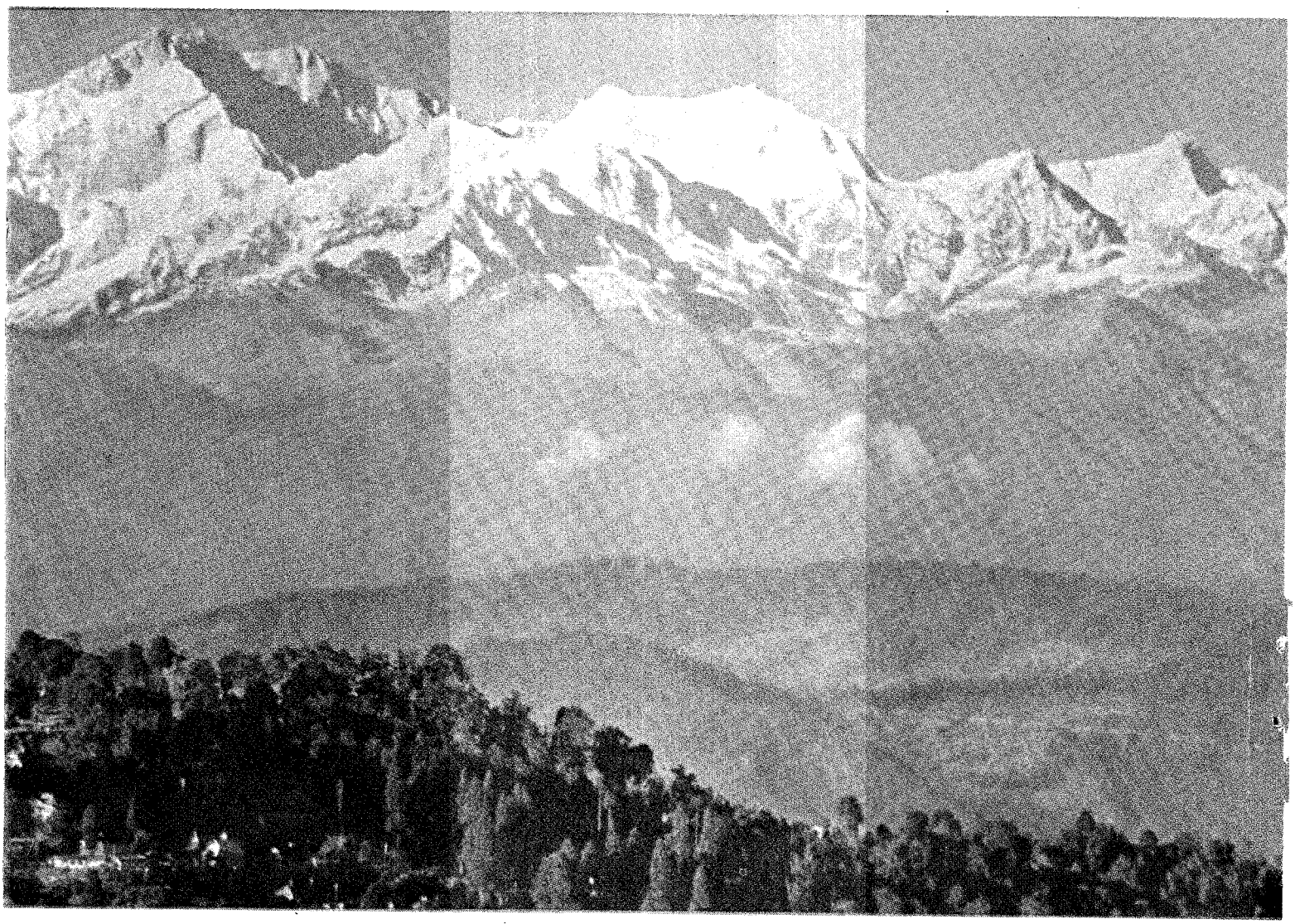

Try the Himalayas.

Even the seasoned Alpine traveller gets a shock at the sheer physical size of the Himalayas. When you get to the cool, breezy top of Tiger Hill in Darjeeling you can see a panorama of mountains up to 13,000 feet higher than anything in Switzerland. Standing there, it's hard to realize that the lush tropical coast of Southern India is just a few hours away. India is like that. It's a country of contrasts. You can be staying in an air-conditioned hotel while, outside, street musicians play strange-sounding melodies virtually unchanged from the 17th century. When you visit the huge, fresco-covered caverns at Ajanta and Ellora you can make most of the trip by modern airliner. But slow-moving bullock carts will share the road with the automobile that takes you the rest of the way. For brochures about India, see your Travel Agent. Or write to the Government of India Tourist Office.

India

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